Air Quality Permitting
Statement of Basis

December 21, 2005

Permit to Construct No. P-050019

Renewable Energy of Idaho, Emmett

Facility ID No. 045-00006

Prepared by: H.E.

Harbi Elshafei, Air Quality Permitting Analyst 3
AIR QUALITY DIVISION

FINAL

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Acronyms, Units, and Chemical Nomenclature

AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
Btu	British thermal unit
CAA	Clean Air Act
CEMS	Continuous Emissions Monitoring System
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
gr/dscf	grain (1 lb = 7,000 grains) per dry standard cubic foot
HAPs	Hazardous Air Pollutants
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
km	kilometer
lb/hr	pound per hour
MACT	Maximum Available Control Technology
MW	megawatt
MMBtu	Million British thermal units
NESHAP	Nation Emission Standards for Hazardous Air Pollutants
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
PM	Particulate Matter
PM_{10}	Particulate Matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	Permit to Construct
PTE	Potential to Emit
REI	Renewable Energy of Idaho
ROFA	Rotating Opposed Fired Air
Rules	*Rules for the Control of Air Pollution in Idaho*
SNCR	Selective Non-Catalytic Reduction
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	sulfur dioxide
T/R	transformer/rectifier
T/yr	Tons per year
$\mu g/m^3$	micrograms per cubic meter
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200 et seq., *Rules for the Control of Air Pollution in Idaho* (*Rules*) for issuing Permits to Construct (PTC).

2. FACILITY DESCRIPTION

The proposed facility will consist of one woodwaste-fired stoker boiler, one steam turbine generator, a cooling tower, and dry kilns, and milling operations (debarker, sawmill, planer, shaving silos, hog, woodwaste material handling, and screens). The woodwaste fuel which is fed to the boiler is generated from the associated sawmill and planer mill and also brought to the facility from other sources in the local area. A pipeline quality natural gas will only be used during startup of the stoker boiler. The boiler will be used to generate steam for the purpose of generating electricity, with nearly continuous operation. Additionally, part of the steam produced will be used to operate the dry kilns and the milling operations. It is assumed that the boiler will operate approximately 24 hours per day, 339 days per year (8,146 hours/year).

The milling operations consist of a debarker, sawmill, planer, hog, screens, and two dry kilns. The milling operations are assumed to be 16 hours per day, five days per week, and 52 weeks per year (4,160 hours per year). The debarker will remove bark from the logs. The bark will be used as a boiler fuel. Two saws will be used for cutting logs to the proper length for processing in the sawmill. The debarker will in an enclosed structure. Debarked logs will be transported to the sawmill by way of a ground conveyor. The sawmill will be in an enclosed two level structure. Debarked and cut logs will be conveyed into the bottom level. The sawmill equipment will be located in the top level. Water will be sprayed onto the saws to control the emissions of the sawdust and to cool the saw blades. Any fines generated from the sawmill operation will be transported with the bark from the debarker by conveyor to the fuel house. The planer will be located in an enclosed structure. A pneumatic system will be used to transport planer shavings to cyclones atop 40-foot shavings storage silos. There will be a total of two cyclones and shaving storage silos. Two dry kilns located on site will be indirectly heated by steam from the boiler.

Woodwaste from other sources in the local area will be delivered to the facility in trucks. Trucks will enter the property on the east side where they will be weighed by scales. Woodwaste from the trucks will be unloaded using a back on truck. The truck dump will raise the truck in the air until all woodwaste is unloaded. A water spray will be utilized to mist the woodwaste as it is unloaded. A two-sided wall (16-20 feet tall) will also provide containment in the truck dump conveyor. The sprayed material will initially enter a screening system. Woodwaste passing through the screens will be conveyed directly to fuel storage. The oversized woodwaste (larger than 5-inch pieces) will be sent to the stationary wood hog. The hog will be located next to the truck dump on the east end of the concrete pad. The hog will reduce the size of incoming woodwaste and return it to the screen. The fuel passing through the screen will be metered onto the enclosed 48-foot belt conveyor that runs the full length of the fuel site into the roofed fuel house or into the fuel pile. In the fuel house, the fuel will drop onto a cross belt and be metered into three separate bays for mixing by moisture content. After being mixed the fuel will be fed onto a conveyor with a drag chain system and metered into the boiler. The fuel house will be a 3-sided structure with a roof open on the east side. The storage area will have a 20-foot retaining wall on the south and east sides and there will be an apron to guide the pushed fuel into the fuel house.

Ash generated in the boiler will be conveyed to an enclosed bin. Ash will be transported off site to customers by way of truck. Trucks will be loaded with ash by parking under the bin. The ash truck loading will take place in an enclosed building and the truck trailers will be covered with a tarp before leaving the building.

Emissions at the facility occur from point sources such as the woodwaste boiler stack and from the dry kiln vents and cooling tower. Fugitive emissions can occur from vehicles driving on paved and unpaved roads and from the debarker, sawmill, planer mill, hog, and screens.

The particulate matter (PM) and PM_{10} emissions from the stoker boiler are controlled by an electrostatic precipitator (ESP). The oxides of nitrogen and the carbon monoxide emissions from the boiler stack are controlled by selective non-catalytic reduction (SNCR) system and by the rotating opposed fired air (ROFA).

3. FACILITY / AREA CLASSIFICATION

This facility is located at 500 West Main, Emmett, Idaho. Emmett is located in Gem County and is within Air Quality Control Region (AQCR) 63 and Universal Transverse Mercator (UTM) Zone 11. Gem County is designated as unclassifiable for all criteria air pollutants (PM_{10}, carbon monoxide [CO], oxides of nitrogen [NO_x], sulfur dioxide [SO_2], lead, and ozone).

The primary Standard Industrial Classification (SIC) code for the facility is 4961, *Steam and Air-Conditioning Supply*. Establishments in the primary SIC code are engaged in the production and/or distribution of steam and heated or cooled air for sale. The secondary SIC code for this facility is 2421, *Sawmills and planning Mills, General.*

The Aerometric Information Retrieval System (AIRS) facility classification for this facility is "A" because the potential to emit NO_x is greater than the applicable major source threshold, 100 T/yr. The AIRS information provided in Appendix C of this statement of basis defines the classification for each regulated air pollutant at REI.

The facility is not subject to Prevention of Significant Deterioration (PSD) requirements because its potential to emit is less than all applicable PSD major source thresholds. This facility is not a designated facility, as defined in IDAPA 58.01.01.006.27.

4. APPLICATION SCOPE

REI has submitted a PTC application for the following:

- Construction of a new 18 megawatt woodwaste-fired boiler with a rated heat input capacity of 280 million British Thermal Unit (MMBtu), one steam turbine generator, a cooling tower, woodwaste material handling, and milling operations (i.e., debarker, sawmill, planer, shaving silos, hog, screens, and dry kilns).
- An ESP to control the PM and PM_{10} emissions from the boiler.
- An SNCR and ROFA to control the NO_x and CO emissions from the boiler.

DEQ will process the permit as a PTC because the facility is a new facility.

4.1 Application Chronology

4/15/05	A 15-day Pre-PTC application received
4/15/05	$1,000 PTC application fee received
4/22/05	REI requested to review the draft PTC
4/29/05	DEQ sent REI a 15-day Pre-PTC denial letter
5/12/05	DEQ sent incompleteness letter to REI
5/24/05	DEQ received from REI a resubmittal for a 15-day Pre-PTC application
5/31/05	REI submitted to DEQ revised supplemental information
6/23/05	DEQ sent REI a completeness letter
7/21/05	Additional information received by DEQ
7/26/05	Revised modeling information received by DEQ (for the cyclones)
8/11/05	DEQ sent REI a PTC notification of conditional approval letter

4.2 Permit Chronology

11/10/05	Pre-draft permit sent via e-mail to Boise Regional Office for review
11/10/05	Draft permit issued to facility

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC.

5.1 Equipment Listing

Woodwaste fuel stoker boiler
Manufacturer: Zurn
Year manufactured: 1986
Model No.: Not available
Rated heat input capacity: 280 million Btu/hr
Rated steam rate: 177,000 pounds per hour
Fuel value: 8,613 Btu/dry pound

Electrostatic precipitator (ESP)
Manufacturer: National Energy Production Company
Model No.: Not available
No. of T/R sets: 3 at 500 milliamper
Particulate matter removal efficiency: 98.8%

SNCR system
Manufacturer: Mobotec USA
Model No.: Not available

ROFA system
Manufacturer: Mobotec USA
Model No.: Not available

Dry kilns (2)
Manufacturer: Wellons- double tracks

Cooling tower (two cells)
Manufacturer: Not available
Model No.: Not available

5.2 Emissions Inventory

The REI's consultant, CH2M HILL, submitted an emissions inventory for criteria, toxic, and hazardous air pollutants from the new woodwaste boiler, dry kilns and milling operations that are proposed for construction at the facility. Appendix A of this statement of basis contains the emissions estimates for particulate matter (PM), PM_{10}, CO, NO_x, SO_2, and volatile organic compound (VOC) that were provided by the facility and are shown in Table 5.1. Toxic air pollutants (TAPs) and hazardous air pollutant (HAPs) emissions estimates that were provided by the facility are shown in Appendix A of this document. Emissions estimates for the criteria air pollutants, TAPs, and HAPs were obtained from emissions factors described in AP-42, Section 1.6, dated September 2003, factors for wood residue combustion, and from Idaho DEQ emission factor guide for wood industry (1/1997). The PM and PM_{10} emissions from the cooling tower were estimated using emissions methods described in AP-42, Section 13.4-1 (wet cooling towers). Emissions estimates were checked by DEQ staff and were found to be acceptable. The facility's emissions inventory is included in Appendix A of this statement of basis.

Potential emissions of any single HAP were estimated to be less than 10 T/yr. Potential emissions for two HAPs or more were estimated to be below the major source threshold of 25 T/yr for a combination of two HAPs or more – refer to Appendix A.

The assumptions presented by the permittee in attachment C (Revised Emissions Estimates) of the supplemental information application that was received on 5/24/05, concerning the emissions inventory from the facility appear reasonable.

Table 5.1 shows the estimated point source emissions of the pollutants from the boiler, dry kilns, storage silos, and the cooling tower. The modeling done for PM_{10}, NO_x, SO_2, and CO emissions in the PTC application demonstrated compliance with NAAQS – refer to the modeling memorandum in Appendix B of this document.

The boiler toxic air pollutant emission estimates list is extensive and is included in Appendix A. None of the TAPs exceeded the acceptable ambient concentrations (AAC) specified in IDAPA 58.01.01.585 or 586.

Table 5.1 POINT SOURCES EMISSION INVENTORY

Source	PM[a]		PM10[b]		Nitrogen Oxides		Sulfur Dioxide		Carbon Monoxide		VOC[c]		HAPs[f]	
	(lb/hr)[d]	(T/yr)[e]	(lb/hr)[d]	(T/yr)[e]	(lb/hr)[d]	(T/yr)[e]	(lb/hr)[d]	(T/yr)[e]	(lb/hr)[d]	(T/yr)[e]	(lb/hr)[d]	(T/yr)[e]	(lb/hr)[d]	(T/yr)[e]
Stoker Boiler	3.0	12.3	3.0	12.3	42.1	171.1	1.3	5.4	21.6	87.6	3.0	15.9	5.1	20.9
Dry Kilns	2.90	6.1	1.67	3.5	--	--	--	--	--	--	8.54	17.8	0.53	1.11
Storage Silos	0.98	2.1	0.88	1.84	--	--	--	--	--	--	--	--	--	--
Cooling Tower	2.21	9.7	0.66	2.9	--	--	--	--	--	--	--	--	--	--
Total:	9.1	30.2	6.21	20.54	42.1	171.1	1.3	5.4	21.6	87.6	11.54	33.7	5.63	22.01

a. Particulate Matter
b. Particulate Matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
c. Volatile Organic Compounds
d. Pounds per hour
e. Tons per year
f. Hazardous air pollutants

Renewable energy of Idaho uses urea in the SNCR which will generate NH_3. The NH_3 emissions from the stack are called the ammonia slip, which is the amount of ammonia that does not react and passes through the system and out the stack. The NH_3 slip emissions, as estimated by the applicant, are 4.12 lb/hr and 16.77 T/yr. Ammonia emissions are included in Appendix A of this document. Ammonia emissions satisfied the requirements of AAC specified in IDAPA 58.01.01.585.

5.3 Modeling

The permittee supplied National ambient Air Quality Standards (NAAQS) and TAPs ambient impact demonstrations in support of the PTC application. The DEQ's modeling memorandum concerning the review of these ambient impact demonstrations is included in Appendix B of this statement of basis. The results show that the facility has demonstrated compliance with the NAAQS and with IDAPA 58.01.01.585 and 586 to the satisfaction of DEQ.

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201.............................. Permit to Construct Required

A permit to construct is required for the construction and operation of the boiler, dry kilns, cooling tower, and the milling operations because these stationary sources don't qualify for PTC exemption in any of Sections 220 through 223 of the Rules. Therefore, a PTC is required.

IDAPA 58.01.01.676.............................. Burning Equipment – Particulate Matter

This rule applies to fuel burning equipment with a maximum rated input of 10 MMBtu/hr or more and commencing operation on or after October 1, 1979. The boiler has a maximum rated input of 280 MMBtu/hr and is new. The limit in the rule for wood product fuel is 0.08 gr/dscf.

Permit Condition 2.5 states, "The permittee shall not discharge to the atmosphere from any fuel-burning equipment PM in excess of 0.080 gr/dscf of effluent gas corrected to 8% oxygen by volume for wood products, in accordance with IDAPA 58.01.01.676."

IDAPA 58.01.01.700.............................. Particulate Matter – Process Weight Limitations

The process weight rule applies to the two kilns because these kilns emit particulates and commenced operation on or after October 1, 1979. The emissions are limited according to the equation in the rule.

The kilns capacity (by permit limit) is 36.8 MM bf/yr. The PM emission estimate is 6.1 T/yr – refer to PTC application.

The following calculations establish the lumber drying kilns process weight and the corresponding PM emissions limitation.

(32 lb/cf[1]) x (0.054 cf/bf[2]) x (36.8 million bf/year) / (8,760) hours kiln operations/year) = 7,259lb/hr, average process weight for one hour.

[1] AP-42, Appendix B, density of Douglas fir (representative density for all lumber species).
[2] Conversion from 1 bf, based on 2-by-4s, to 1 cf.

The PM process weight limitation for sources constructed on or after October 1, 1979, and having a process weight less than 9,250 lb/hr, is determined using the following equation (IDAPA 58.01.01.701):

$E = 0.045\ (PW)^{0.60}$

$E = 0.045\ (7{,}259))^{0.60} = 9.33$ lb/hr allowable PM emissions

Actual estimated hourly PM emissions:

36,800 mbf/yr x 0.33 lb PM/mbf* lumber / 8760 hr/yr = 1.39 lb/hr average hourly PM emission rate

* Idaho DEQ Emission Factor Guide for Wood Industry

The estimated hourly PM emissions are less than the calculated allowable PM emission limit.

IDAPA 58.01.01.205 .... Permit Requirements for New Major Facilities or Major Modifications in Attainment or Nonattainment Areas

IDAPA 58.01.01.205 incorporates the federal PSD program in the state New Source Review Rules. Emissions associated with this project were estimated to establish the facility's potential to emit to demonstrate that the REI facility is a new non-major source with regard to PSD regulations at the time the PTC application was submitted. The REI facility is not a designated facility.

IDAPA 58.01.01.210 .... Demonstration of Preconstruction Compliance with Toxic Standards

The TAPs emissions resulting from burning woodwaste in the boiler and from drying kilns were estimated. Appendix A of this document contains all TAPs emissions from the facility. All TAPs emissions from the facility were demonstrated to meet the requirements in IDAPA 58.01.01.210. Refer to the modeling review memorandum in Appendix B of this document.

IDAPA 58.01.01.213 .... Pre-Permit Construction

IDAPA 58.01.01.213.01 .... Pre-Permit Construction Eligibility

The REI facility is new non-major source with regard to PSD regulations.

<u>IDAPA 58.01.01.213.01.a</u>

The permittee submitted a PTC application meeting the requirements of IDAPA 58.01.01.202.01.a, 202.02, and 202.03.

IDAPA 58.01.01.213.b.

The permittee and their consultant held a conference call with DEQ prior to submitting the PTC application.

IDAPA 58.01.01.213.c

The permittee submitted the documentation specified in IDAPA 58.01.01.213.c, including a copy of the public notice and an ambient impact demonstration conducted in accordance with a DEQ-approved protocol.

40 CFR 63 Subpart DDDD.................... NESHAPS: Plywood and Composite Wood Products

40 CFR 63.2231 (a) and (b) establish applicability requirements for this NESHAP standard, and read:

This subpart applies to you if you meet the criteria in paragraphs (a) and (b) of this section, except for facilities that the Environmental Protection Agency (EPA) determines are part of the low-risk subcategory of PCWP manufacturing facilities as specified in appendix B to this subpart.

(a) You own or operate a PCWP manufacturing facility. A PCWP manufacturing facility is a facility that manufactures plywood and/or composite wood products by bonding wood material (fibers, particles, strands, veneers, etc.) or agricultural fiber, generally with resin under heat and pressure, to form a structural panel or engineered wood product. Plywood and composite wood products manufacturing facilities also include facilities that manufacture dry veneer and lumber kilns located at any facility. Plywood and composite wood products include, but are not limited to, plywood, veneer, particleboard, oriented strandboard, hardboard, fiberboard, medium density fiberboard, laminated strand lumber, laminated veneer lumber, wood I-joists, kiln-dried lumber, and glue-laminated beams.

(b) The PCWP manufacturing facility is located at a major source of HAP emissions. A major source of HAP emissions is any stationary source or group of stationary sources within a contiguous area and under common control that emits or has the potential to emit any single HAP at a rate of 9.07 megagrams (10 tons) or more per year or any combination of HAP at a rate of 22.68 megagrams (25 tons) or more per year.

The REI has HAP emissions of less than 10 tons per year of any single HAP and less than 25 tons per year of combined HAPs (see emissions inventory and Appendix A). 40 CFR 63.2231(a) includes lumber kilns located at any facility as applicable. 40 CFR 63.2231(b) includes facilities that emit or have the potential to emit any single HAP at a rate of 10 tons per year or more or any combination of HAPs at a rate of 25 tons per year or more. 40 CFR 63.2231 specifies that the subpart applies if the facility meets the criteria of both (a) and (b). The REI meets the criteria of (a) but not of (b) since the federally-enforceable permit conditions established by this permit limit the potential to emit of HAPs to less than 10 tons per year of any single HAP and to less than 25 tons per year of any combination of HAPs. Therefore, 40 CFR 63 Subpart DDDD does not apply to REI.

40 CFR 63 Subpart DDDDD.................. NESHAPS: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

40 CFR 63.7485 establish applicability requirements for this NESHAP standard, and read:

"You are subject to this subpart if you own or operate an industrial, commercial, or institutional boiler or process heater as defined in 40 CFR 63.7575 that is located at, or is part of, a major source of HAP as defined in 40 CFR 63.2 or 40 CFR 63.761,.."

This subpart does not apply to REI's woodwaste boiler because the emissions of any single HAP is less than 10 T/yr, and the emissions of two HAPs or more were estimated to be below the major source threshold of 25 T/yr for a combination of two HAPs or more – for HAPs emissions estimates see Appendix A of this document.

IDAPA 58.01.01.300 .... Procedures and Requirements for Tier I Operating Permits

Upon issuance of this PTC, the potential emissions of NO_x will be 171.1 T/yr. Therefore, the facility is major as defined by IDAPA 58.01.01.008.

The permittee is required to include all applicable requirements of this PTC in the Tier I operating permit application. Information requirements regarding the Tier I permit application are specified by IDAPA 58.01.01.314.

40 CFR 60 Subpart D .... Standards of Performance for Fossil-Fuel-Fired Steam Generators for Which Construction is Commenced After August 17, 1971

40 CFR 60.40 (a) (1) and (2) establish applicability requirements for this NSPS standard, and read:

(1) Each fossil-fuel-fired steam generating unit of more than 73 megawatts heat input rate (250 million Btu per hour).
(2) Each fossil-fuel and wood-residue-fired steam generating unit capable of firing fossil fuel at a heat input rate of more than 73 megawatts (250 million Btu per hour)
(b) Any change to an existing fossil-fuel-fired steam generating unit to accommodate the use of combustible material, other than fossil fuels as defined in this subpart, shall not bring that unit under the applicability of this subpart.
(c) Except as provided in paragraph (d) of this section, any facility under paragraph (a) of this section that commenced construction or modification after August 17, 1071, is subject to the requirements of this subpart.

This subpart does not apply to REI's woodwaste boiler because the woodwaste is not defined as fossil fuel. Fossil fuel is defined in 40 CFR 60.41 (b) as natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

40 CFR 60 Subpart Da .... Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978

40 CFR 60.40a (a) (1) and (2) and (b) and (c) establish applicability requirements for this NSPS standard, and read:

(a) The affected facility to which this subpart applies is each electric utility steam generating unit:

(1) That is capable of combusting more than 73 megawatts (250 million Btu per hour) heat input rate of fossil fuel (either alone or in combination with any other fuel); and
(2) For which construction or modification is commenced after September 18, 1978.
(b) Unless and until subpart GG of this part extends the applicability of subpart GG of this part to electric utility steam generators. This subpart applies to electric utility combined cycle gas turbines that are capable of combusting more than 73 megawatts (250 million Btu/hour) heat input of fossil fuel in the steam generator. Only emissions resulting from combustion of fuels in the steam generating unit are subject to this subpart. (The gas turbine emissions are subject to subpart GG of this part.)
(b) Any change to an existing fossil-fuel-fired steam generating unit to accommodate the use of combustible material, other than fossil fuels as defined in this subpart, shall not bring that unit under the applicability of this subpart.

(c) Any change to an existing steam generating unit originally designed to fire gaseous or liquid fossil fuels, to accommodate the use of any other fuel (fossil or nonfossil) shall not bring that unit under the applicability of this subpart.

This subpart does not apply to REI's woodwaste boiler because the woodwaste is not defined as fossil fuel. Fossil fuel is defined in 40 CFR 60.41a as natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

40 CFR 60 Subpart Db .... Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

The REI's new woodwaste-fired stoker boiler is rated at 280 MMBtu/hr. Section 60.40b states, for applicability:

"The affected facility to which this subpart applies is each steam generating unit that commences construction, modification, or reconstruction after June 19, 1984, and that has a heat input capacity from fuels combusted in the steam generating unit of greater than 29 MW (100 million Btu/hour.)"

Therefore, this regulation is applicable to the boiler.

Section 60.43b (c) states:

"On and after the date on which the initial performance test is completed or is required to be completed under Section 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts wood, or wood with other fuels, except coal, shall cause to be discharged from that affected facility any gases that contain particulate matter in excess of the following emission limits:

(1) 43 ng/J (0.10 lb/million Btu) heat input if the affected facility has an annual capacity factor greater than 30 percent (0.30) for wood.

(2) 86 ng/J (0.20 lb/million Btu) heat input if

(i) The affected facility has an annual capacity factor of 30 percent (0.30) or less for wood,

(ii) Is subject to a federally enforceable requirement limiting operation of the affected facility to an annual capacity factor of 30 percent (0.30) or less for wood, and

(iii) Has a maximum heat input capacity of 73 MW (250 million Btu/hour) or less."

The boiler has an annual capacity factor greater than 30% for wood (it burns wood exclusively). Therefore, the particulate matter limit is 0.1 lb/million BTU heat input.

Permit Condition 2.5 is written in the permit which limits the particulate emissions from the boiler to 0.1 lb/MMBtu. Compliance is assessed through performance testing as required in 40 CFR 60.8.

Section 60.43b (f) and (g) state:

(f) On and after the date on which the initial performance test is completed or is required to be completed under 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, oil, wood, or mixtures of these fuels with any other fuels shall cause to be discharged into the atmosphere any gases that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity.

(g) The particulate matter and opacity standards apply at all times, except during periods of startup, shutdown or malfunction."

These two requirements were incorporated into the permit as Permit Condition 2.5 and 2.7.

Compliance with this performance test requirement is assessed by the following permit condition:

2.19.1 Within 60 days after achieving the maximum production rate at which the boiler will be operated, but not later than 180 days after initial startup of the boiler and at such other times as may be required by the Environmental Protection Agency (EPA) under section 114 of the Act, the permittee shall conduct performance test(s) and furnish the EPA a written report of the results of such performance test(s) in accordance with 40 CFR 60.8. The permittee shall also provide a copy of the results of any testing done per this permit condition to DEQ in accordance with Permit Condition 2.27.

The performance testing is to determine compliance with the particulate matter emissions limits and opacity specified in Permit Conditions 2.5 and 276.

Section 60.48b (a) states:

"The owner or operator of an affected facility subject to the opacity standard under 60.43b shall install, calibrate, maintain, and operate a continuous monitoring system for measuring the opacity of emissions discharged to the atmosphere and record the output of the system."

This rule is paraphrased as Permit Condition 2.13.1. In addition, Permit Condition 2.13.2 requires that the COMS data be reduced and recorded in such a manner that compliance with all applicable opacity standards can be demonstrated. This will allow identification of an exceedance of 20% opacity in any sixty-minute period.

Section 60.49b states, in part:

"The owner or operator of each affected facility shall submit notification of the date of initial startup, as provided by Section 60.7."

Because this is a general requirement for reporting to the Environmental Protection Agency, it was not included as a permit condition in the permit.

Section 60.49b(d) states:

"(d) The owner or operator of an affected facility shall record and maintain records of the amounts of each fuel combusted during each day and calculate the annual capacity factor individually for coal, distillate oil, residual oil, natural gas, wood, and municipal-type solid waste for the reporting period. The annual capacity factor is determined on a 12-month rolling average basis with a new annual capacity factor calculated at the end of each calendar month."

Permit Condition 2.17 was written to address this requirement (see Section 6 of this statement of basis).

Section 60.41b defines "annual capacity factor" as follows:

"Annual capacity factor means the ratio between the actual heat input to a steam generating unit from the fuels listed in §60.42b(a), §60.43b(a), or §60.44b(a), as applicable, during a calendar year and the potential heat input to the steam generating unit had it been operated for 8,760 hours during a calendar year at the maximum steady state design heat input capacity. In the case of steam generating units that are rented or leased, the actual heat input shall be determined based on the combined heat input from all operations of the affected facility in a calendar year."

6. PERMIT CONDITIONS

This section lists permit conditions that are written for the PTC limits, operations, monitoring, recordkeeping, and testing.

Compliance with the NAAQS as demonstrated in the air dispersion modeling is demonstrated using the following limits, which are based on the information supplied in the permit application and supplemental information:

Permit condition 2.3 limits the PM_{10} to 3.0 lb/hr and 12.3 T/yr, the CO to 21.6 lb/hr and 87.6 T/yr, and the NO_x to 42.1 lb/hr and 171.1 T/yr. The PM_{10} limits were included to demonstrate compliance with NAAQS. The CO and NO_x are the pollutants emitted in the greatest quantities and their limits establish the facility's potential to emit.

Permit condition 2.4 limits the NH_3 to 4.12 lb/hr and 16.77 T/yr. The NH_3 slip limits were included because the NH_3 is generated in the boiler from the urea injection in the SNCR system which is used for the controlling NO_x emissions. The NH_3 slip is the amount of ammonia that does not react and passes through the system and out of the stack. The NH_3 slip emissions were based on SNCR system tuning that uses 10 parts per million of NH_3. Thus, an NH_3 emission limits are included and that emissions will be confirmed by a source test, as required in Permit Condition 2.22.

Permit Condition 2.5 limits PM emissions from the boiler stack to the 0.1 pounds per million Btu of heat as required by 40 CFR 60.43b (c) (1).

Permit Condition 2.19 requires the permittee conduct a performance test to measure PM emissions to demonstrate compliance with Permit Condition 2.5. Testing is required at least once every five years.

Permit Condition 2.6 limits the PM emissions from any fuel-burning equipment to an excess of 0.08 gr/dscf of effluent gas corrected to 8% O_2 by volume for wood products as required by IDAPA 58.01.01.676. The PM performance test requirements in Permit Condition 2.19 will be used to determine compliance with Permit Condition 2.6.

Permit Condition 2.7 limits the opacity limit to no more than 20% opacity (six-minute average), except for one six-minute period per hour of not more than 27% opacity as required by IDAPA 40 CFR 60.43b (f). The opacity and the PM standards apply at all times, except during periods of startup, shutdown or malfunction as required in with 40 CFR 60.43b (g).

The PM performance test requirements in Permit Condition 2.19 will be used to determine compliance with Permit Condition 2.7. In addition, the COM that will be installed (see Permit Condition 2.13) in accordance with 40 CFR 60.48b (a) will be used to demonstrate compliance with Permit Condition 2.7.

Permit Condition 2.8 contains the state of Idaho opacity standard for point sources. The visible emissions monitoring in Permit Condition 2.16 will be used to determine compliance with Permit Condition 2.8.

Permit Condition 2.9 requires the permittee to comply with the excess emissions requirements as required in IDAPA 58.01.01.130-136. The compliance demonstration is contained within the text of IDAPA 58.01.01.130-136 of the Rules. No further clarification is necessary here.

Permit Conditions 2.10 and 2.11 require the permittee to fire the boiler exclusively with wood products. Emissions estimates for the boiler were estimated using emissions factors for the combustion of woodwaste as fuel. The operation of the boiler on woodwaste will not exceed a maximum of 8,146 hours per any consecutive 12-month period. However, the boiler will start-up by using only natural gas fuel for 25 hours per any consecutive 12-month period. Operation limit on natural gas was included in the PTC.

Permit Condition 2.25 requires the permittee to monitor the boiler's hours of operation on monthly and yearly bases while operating on woodwaste and on natural gas.

Permit Condition 2.12 requires the permittee to install ESP to control the PM, PM_{10}, and opacity emissions. Permit Condition 2.12 also requires the permittee to install an SNCR and ROFA to control NO_x and CO emissions.

Permit Condition 2.13 requires the permittee to install, calibrate, maintain, and operate a COM system for measuring the opacity of emissions discharged to the atmosphere and record the output of the system in accordance with 40 CFR 60.48b (a).

Permit Condition 2.14 requires the permittee to install, calibrate, maintain, and operate a CEMS for measuring the NO_x of emissions discharged to the atmosphere and record the output of the system as requested by the permittee.

Permit Condition 2.15 requires the permittee to install, calibrate, maintain, and operate a CEMS for measuring the CO of emissions discharged to the atmosphere and record the output of the system as requested by the permittee.

Permit Condition 2.17 requires the permittee to monitor and record the amount of fuel combusted in the boiler during each day, each month, and for the most recent 12-month period in accordance with 40 CFR 60.49b (d). It also requires the permittee to calculate the annual capacity for wood in accordance with 40 CFR 60.49b (d).

Permit Condition 2.20 requires the permittee to conduct a CO source test from the boiler stack. The source test will be conducted to demonstrate compliance with the CO emission rate limits listed in Permit Condition 2.3.

Permit Condition 2.21 requires the permittee to conduct a NO_x source test from the boiler stack. The source test will be conducted to demonstrate compliance with the NO_x emission rate limits listed in Permit Condition 2.3.

Permit Condition 2.22 requires the permittee to conduct a NH_3 source test from the boiler stack. The source test will be conducted to demonstrate compliance with the NH_3 emission rate limits listed in Permit Condition 2.4.

Permit Condition 2.23 requires the permittee to monitor and record on an hourly basis the secondary voltage and amperage applied by each T/R set to the discharge electrodes.

Monitoring is required for the power input to the ESP to demonstrate compliance with Permit Condition 2.12.

Permit Condition 2.24 requires the permittee to develop an O&M manual for the ESP within 60 days of operation of the boilers.

It is important for the control of PM and PM_{10} emissions from the ESP that the boiler and the ESP be operated correctly. Therefore, Permit Condition 2.24 was written to insure that the ESP is operated in accordance with an operations and maintenance manual.

Permit Condition 2.26 requires the permittee to submit a performance test protocol for approval to conduct a PM, CO, NO_x, and NH_3 source tests.

DEQ recommends that the permittee submit a performance test protocol for the source tests required in this permit. The protocol will ensure that the plan for conducting the test is correct so that the test can be approved and the results used as was intended in the permit.

Permit Condition 2.27 requires the permittee to submit a report of the results of any performance tests required in Permit Conditions 2.19, 2.20, 2.21, and 2.22.

In order for DEQ to use the performance test results, the test information must be submitted in a timely manner.

Permit Condition 2.28 requires the permittee to submit a notification of the NSPS requirements as required in 40 CFR 60.49b. The 40 CFR 60 - Subpart Db requires the permittee to submit a notification of the date of initial startup of the woodwaste boiler. In addition, it requires to submit a report of any excess emissions which occurred during the reporting period. It also requires to submit to the administrator the performance test data from the initial performance test evalualtion of the CEMS using applicable performance specifications in Appendix B in accordance with 40 CFR 60.49b(b).

Permit Condition 3.3 for opacity limit for the drying kilns. This permit condition contains the state of Idaho opacity standard for point sources. No additional monitoring or recordkeeping is required in the PTC to demonstrate compliance with the opacity limit.

Permit Condition 3.4 requires the permittee to establish a throughput limits to the dry kilns that shall not exceed 36.8 million board feet during any consecutive 12-month period.

The throughput limit for the kilns was established based on the throughput used in the air dispersion modeling analysis for PM_{10}. This throughput limit has been demonstrated to the satisfaction of DEQ that it will not cause or contribute to an exceedance of the NAAQS for PM_{10}. In addition, this throughput limit inherently limits the formaldehyde emissions from the kilns in accordance with IDAPA 58.01.01.210.

Permit Condition 3.5 requires the permittee to monitor and record the monthly and annual throughput of lumber to the drying kilns to demonstrate compliance with Permit Condition 3.4.

Permit Condition 4.3 requires the permittee to comply with the visible emissions limit from the shaving storage silo stacks. The visible emissions monitoring in Permit Condition 4.4 will be used to determine compliance with Permit Condition 4.3.

Permit Condition 4.5 requires the permittee to develop an O&M manual for the cyclones within 60 days of operation of the silos.

Permit Condition 5.3 requires the permittee to comply with the visible emissions limit from the cooling tower. The visible emissions monitoring in Permit Condition 5.4 will be used to determine compliance with Permit Condition 5.3.

Permit Condition 6.3 requires the permittee to take all reasonable precautions to prevent particulate matters from becoming airborne in accordance with IDAPA 58.01.01.650-651.

Compliance Demonstration with Permit Condition 6.3

Permit Condition 6.4.1 states that the permittee is required to monitor and maintain records of the frequency and the methods used by the facility to reasonably control fugitive particulate emissions. IDAPA 58.01.01.651 gives some examples of ways to reasonably control fugitive emissions which include using water or chemicals, applying dust suppressants, using control equipment, covering trucks, paving roads or parking areas, and removing materials from streets.

Permit Condition 6.4.2 requires that the permittee maintain a record of all fugitive dust complaints received. In addition, the permittee is required to take appropriate corrective action as expeditiously as practicable after receipt of a valid complaint. The permittee is also required to maintain records that include the date that each complaint was received and a description of the complaint, the permittee's assessment of the validity of the complaint, any corrective action taken, and the date the corrective action was taken.

To ensure that the methods being used by the permittee to reasonably control fugitive PM emissions whether or not a complaint is received, Permit Condition 6.5 requires that the permittee conduct monthly facility-wide inspection of potential sources of fugitive emissions during daylight hours and under normal operating conditions. If the permittee determines that the fugitive emissions are not being reasonably controlled, the permittee shall take corrective action as expeditiously as practicable. The permittee is also required to maintain records of the results of each fugitive emission inspection.

Both Permit Conditions 6.4.2 and 6.5 require the permittee to take corrective action as expeditiously as practicable. In general, DEQ believes that taking corrective action within 24 hours of receiving a valid complaint or determining that fugitive particulate emissions are not being reasonably controlled meets the intent of this requirement. However, it is understood that, depending on the circumstances, immediate action or a longer time period may be necessary.

7. PERMIT FEES

The REI paid the PTC application fee of $1,000.00 on April 15, 2005. A PTC processing fee of $7,500.00 is required in accordance with IDAPA 58.01.01.225 because the increase in emissions from the facility is more than 100 T/yr. The processing fee was paid on November 10, 2005.

Table 7.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	171.1	0.0	171.1
SO_2	5.4	0.0	5.4
CO	87.6	0.0	87.6
PM_{10}	20.5	0.0	20.5
VOC	33.8	0.0	33.8
TAPS/HAPS	38.8	0.0	38.8
Total:	357.20	0.0	**357.2**
Fee Due	**$7,500.00**		

8. PERMIT REVIEW

8.1 *Regional Review of Draft Permit*

DEQ's Boise Regional Office was provided the draft permit for review on November 10, 2005.

8.2 *Facility Review of Draft Permit*

The facility was provided a draft permit for review on August 26, 2005 and November 10, 2005.

8.3 Public Comment

An opportunity for public comment period on the PTC application was provided in accordance with IDAPA 58.01.01.209.01.c. from July 13, 2005 through August 12, 2005. During this time, there were no comments on the application and no requests for public comment period on DEQ's proposed action.

9. RECOMMENDATION

Based on review of application materials, and all applicable state and federal rules and regulations, staff recommends that Renewable Energy of Idaho in Emmett be issued final PTC No. P-050019. An opportunity for public comment on the air quality aspects of the proposed PTC was provided in accordance with IDAPA 58.01.01.209.01.c. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

HE/sd Permit No. P-050019

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APPENDIX A

Renewable Energy of Idaho, Emmett

P-050019

Emissions Inventory

Renewable Energy of Idaho
Facility Summary Sheet

Unit No.	Source Description	Emission Factor Source	NOx (lb/hr)	NOx (tpy)	CO (lb/hr)	CO (tpy)	VOC (lb/hr)	VOC (tpy)	PM10 (lb/hr)	PM10 (tpy)	SOx (lb/hr)	SOx (tpy)	PM (lb/hr)	PM (tpy)	HAPS (lb/hr)	HAPS (tpy)
	Fuel Delivery Haul Road Traffic															
ROAD	wood waste transport road traffic and ash transport haul road traffic	AP-42 13.2.1							1.70	2.70			8.72	13.82		
	Fuel Delivery, Handling, and processing															
HOG	Hog	IDEQ							0.06	0.01			0.13	0.03		
SCR	Screen	IDEQ							0.06	0.09			0.12	0.19		
TKUNLD	Truck Unloading	IDEQ							0.93	4.09			1.87	8.19		
TP1	Transfer Point (Hog to Fuel Conveyor) 2	IDEQ							0.03	0.12			0.06	0.24		
TP2	Transfer Point (Main Conveyor to Belt Tripper) 2	IDEQ							0.16	0.68			0.31	1.37		
TP3	Transfer Point (Belt Tripper to Fuel House) 2	IDEQ							0.11	0.49			0.22	0.97		
TP4	Transfer Point (Bucking Saws to Debarker) 2	IDEQ							0.12	0.53			0.24	1.07		
TP5	Transfer Point (Two Shaving Silos) 2	IDEQ							0.006	0.03			0.01	0.05		
PILE	Wood storage pile transfer, wind erosion								0.49	2.12			0.97	4.25		
DEB	**Debarker**	IDEQ							0.21	0.13			0.47	0.29		
SAW	**Sawmill**	IDEQ							0.39	0.82			0.68	1.43		
PLA	**Planer with cyclone**	IDEQ							0.44	0.92			0.49	1.03		
KILN	**Dry Kiln**	IDEQ					8.54	17.8	1.67	3.50			2.90	6.07	0.53	1.11
BOILER	**Boiler Stack (controlled (8,146 hr/yr)**	IDEQ, MFG.	23.4	95.0	21.6	87.6	3.9	15.9	3.0	12	1.3	5.4	3.0	12	5.1	20.9
	Ash Handling	100% control							na	na						
CT1, CT2	**Cooling Tower**	AP-42 Table 13.4-1							0.66	2.90			2.21	9.67		
	Tanks (NA)															
	Demineralized Water Storage Tank						na	na								
	Condensate Tank						na	na								
	Total (Boiler - 8,146 hr/yr, Mill -4160 hr/yr)		23.4	95.0	21.6	87.6	12.4	33.8	10.1	31.4	1.3	5.4	22.4	61.0	5.7	22.0

Notes:
(1) Emissions presented for the wood waste boiler are based 8,146 hr per year operations
(2) HAP emissions presented for the wood waste boiler were calculated using AP-42 section 1.6 emission factors
(3) Criteria pollutant emissions presented for the wood waste boiler were calculated using manuf. Emission guaranties or IDEQ Emission Factor Guide for Wood Industry (1/1997)
(4) NOx emissions will be controlled using ROFA and SNCR, 83% reduction.
(5) Particulate emissions will be controlled using an ESP.

Renewable Energy of Idaho
Ammonia Slip calculation

Exhaust Component	MW (lb/lb-mol€	Exhaust Analysis (mole%)
Argon	39.9	0.812
Nitrogen (N_2)	28	68.0
Oxygen (O_2)	32	5.21
Carbon Dioxide	44	12.19
Water	18	13.79
Sulfur Dioxide	64	0.003

MW of Exhaust (lb/lb-mole)	28.88
Exhaust Flow (lb/hr)	296,455
Exhaust Temperature (°F)	897.28
Exhaust Temperature (K)	753.9
Exhaust Flow Wet (lb-mol/hr)	10,266
Exhaust Flow Dry (lb-mol/hr)	8,850
Heat Input (MMBtu/hr)	280

NH3 Calculation			IDAPA 58.01.01.585 EL (lb/hr)
NH3 ppmvd (12% O2)	5	10	
O2 (wt% dry)	6.04	6.04	
NH3 ppmvd (actual O2%)	8.31	16.62	
NH3 ppmvw (wet exhaust)	7.16	14.33	
NH3Emissions (lb/hr)	2.06	4.12	1.2
NH3 Emissions (tpy)	8.39	16.77	

Exhaust data from 10/14/2004 Gate Cycle Report - prepared by B. Ryan.

Renewable Energy of Idaho
Hazardous Air Pollutants Calculations (HAP)
Stoker Wood Waste Boiler

Hours of Operation	6576	8146	hr/yr
Heat Input =	280.0	280.0	MMBtu/hr

Organic Compound HAP	AP-42 Emission Factor lb/MMBTU		CAA 112(b) HAP?	Emissions lb/hr	HAP Emissions (8760 hr/yr) TPY	IDAPA 58.01.01.585/586 - EL lb/hr	PTE Emission Rate vs. EL
Acenaphthene	9.10E-07		N	2.55E-04	0.00E+00	NA	Below
Acenaphthylene	5.00E-06		N	1.40E-03	0.00E+00	NA	Below
Acetaldehyde	8.30E-04		Y	2.32E-01	9.47E-01	3.00E-03	Exceeds
Acetophenone	3.20E-09		Y	8.96E-07	3.66E-06	NA	Below
Acrolein	4.00E-03		Y	1.12E+00	4.56	0.017	Exceeds
Anthracene	3.00E-06		N	8.40E-04	0.00E+00	NA	Below
Benzene	4.20E-03		Y	1.18E+00	4.79	8.00E-04	Exceeds
Benzo(a)anthracene *	6.50E-08		Y	1.82E-05	7.41E-05	NA	Below
Benzo(a)pyrene *	2.60E-06		Y	7.28E-04	2.97E-03	2.00E-06	Exceeds
Benzo(b)fluoranthene *	1.00E-07		Y	2.80E-05	1.14E-04	NA	Below
Benzo(e)pyrene *	2.60E-09		Y	7.28E-07	2.97E-06	NA	Below
Benzo(g,h,i)perylene *	9.30E-08		Y	2.60E-05	1.06E-04	NA	Below
Benzo(j,k)fluoranthene *	1.60E-07		Y	4.48E-05	1.82E-04	NA	Below
Benzo(k)fluoranthene *	3.60E-08		Y	1.01E-05	4.11E-05	NA	Below
bis(2-Ethylhexyl)phthalate	4.70E-08		Y	1.32E-05	5.36E-05	2.80E-02	Below
Bromomethane (methylene bromide)	1.50E-05		Y	4.20E-03	1.71E-02	NA	Below
2-Butanone (MEK)	5.40E-06		Y	1.51E-03	6.16E-03	39.3	Below
Carbazole	1.80E-06		N	5.04E-04	0.00E+00	NA	Below
Carbon Tetrachloride	4.50E-05		Y	1.26E-02	5.13E-02	4.40E-04	Exceeds
Chlorobenzene	7.90E-04		Y	2.21E-01	9.01E-01	23.3	Below
Chloroform	3.30E-05		Y	9.24E-03	3.76E-02	2.80E-04	Exceeds
Chlorine	2.80E-05		Y	7.84E-03	3.19E-02	0.2	Below
Chloromethane	2.30E-05		N	6.44E-03	0.00E+00	NA	Below
2-Chloronaphthalene	2.40E-09		N	6.72E-07	0.00E+00	NA	Below
Chrysene *	3.80E-08		Y	1.06E-05	4.33E-05	NA	Below
Crotonaldehyde	9.9E-06		N	2.77E-03	0.00E+00	0.38	Below
Decachlorobiphenyl	2.70E-10		N	7.56E-08	0.00E+00	NA	Below
Dibenzo(a,h)anthracene *	9.10E-09		Y	2.55E-06	1.04E-05	NA	Below
Dichlorobiphenyl	7.40E-10		N	2.07E-07	0.00E+00	NA	Below
1,2-Dichloroethane (ethylene dichlorid	2.90E-05		Y	8.12E-03	3.31E-02	2.50E-04	Exceeds
Dichloromethane	2.90E-04		N	8.12E-02	0.00E+00	1.60E-03	Exceeds
1,2-Dichloropropane	3.30E-05		N	9.24E-03	0.00E+00	23.133	Below
2,4-Dinitrophenol	1.80E-07		Y	5.04E-05	2.05E-04	NA	Below
Ethylbenzene	3.10E-05		Y	8.68E-03	3.54E-02	29	Below
Fluoranthene	1.60E-06		N	4.48E-04	0.00E+00	NA	Below
Fluorene	3.40E-06		N	9.52E-04	0.00E+00	NA	Below
Formaldehyde	4.40E-03		Y	1.23E+00	5.02	5.10E-04	Exceeds
Heptachlorobiphenyl	6.60E-11		N	1.85E-08	0.00E+00	NA	Below
Hexachlorobiphenyl	5.50E-10		N	1.54E-07	0.00E+00	NA	Below
Heptachlorodibenzo-p-dioxins	2.00E-09		Y	5.60E-07	2.28E-06	NA	Below
Heptachlorodibenzo-p-furans	2.40E-10		Y	6.72E-08	2.74E-07	NA	Below
Hexachlorodibenzo-p-dioxins	1.60E-06		Y	4.48E-04	1.82E-03	NA	Below
Hexachlorodibenzo-p-furans	2.80E-10		Y	7.84E-08	3.19E-07	NA	Below
Hydrogen chloride **	6.70E-04		Y	0.19	7.64E-01	0.05	Exceeds
Indeno(1,2,3,c,d)pyrene *	8.70E-08		Y	2.44E-05	9.92E-05	NA	Below
2-Methylnaphthalene	1.60E-07		N	4.48E-05	0.00E+00	NA	Below
Monochlorobiphenyl	2.20E-10		N	6.16E-08	0.00E+00	NA	Below
Naphthalene *	9.70E-05		Y	2.72E-02	1.11E-01	3.33	Below
4-Nitrophenol	1.10E-07		Y	3.08E-05	1.25E-04	NA	Below
Octachlorodibenzo-p-dioxins	6.60E-08		Y	1.85E-05	7.53E-05	NA	Below
Octachlorodibenzo-p-furans	8.80E-11		Y	2.46E-08	1.00E-07	NA	Below
Pentachlorodibenzo-p-dioxins	1.50E-09		Y	4.20E-07	1.71E-06	NA	Below
Pentachlorodibenzo-p-furans	4.20E-10		Y	1.18E-07	4.79E-07	NA	Below
Pentachlorobiphenyl	1.20E-09		N	3.36E-07	0.00E+00	NA	Below
Pentachlorophenol	5.10E-08		Y	1.43E-05	5.82E-05	0.033	Below
Perylene	5.20E-10		N	1.46E-07	0.00E+00	NA	Below
Phenanthrene	7.00E-06		N	1.96E-03	0.00E+00	NA	Below
Phenol	5.10E-05		Y	1.43E-02	5.82E-02	1.27	Below
Propionaldehyde	6.10E-05		Y	1.71E-02	6.96E-02	0.0287	Below
Pyrene	3.70E-06		N	1.04E-03	0.00E+00	NA	Below
Styrene	1.90E-03		Y	5.32E-01	2.17	6.67	Below
2,3,7,8-Tetrachlorodibenzo-p-dioxins	8.60E-12		Y	2.41E-09	9.81E-09	NA	Below
Tetrachlorodibenzo-p-dioxins	4.70E-10		Y	1.32E-07	5.36E-07	NA	Below
2,3,7,8-Tetrachlorodibenzo-p-furans	9.00E-11		Y	2.52E-08	1.03E-07	NA	Below
Tetrachlorodibenzo-p-furans	7.50E-10		Y	2.10E-07	8.56E-07	NA	Below
Tetrachlorobiphenyl	2.50E-09		N	7.00E-07	0.00E+00	NA	Below
Tetrachloroethene	3.80E-05		Y	1.06E-02	4.33E-02	1.30E-02	Below
Trichlorobiphenyl	2.60E-09		N	7.28E-07	0.00E+00	NA	Below
1,1,1-Trichloroethane	3.10E-05		N	8.68E-03	0.00E+00	NA	Below
Trichloroethene	3.00E-05		N	8.40E-03	0.00E+00	17.93	Below
Toluene	9.20E-04		Y	2.58E-01	1.05	25	Below
2,4,6-Trichlorophenol	2.20E-08		Y	6.16E-06	2.51E-05	1.20E-03	Below
Vinyl Chloride	1.80E-05		Y	5.04E-03	2.06E-02	9.40E-04	Exceeds
o-Xylene	2.50E-05		Y	7.00E-03	2.86E-02	29	Below

Summary of TAPS/HAPS

Organic Compound HAP	Total Emissions lb/hr	IDAPA 58.01.01.585/586 - EL lb/hr	PTE Emission Rate vs. EL
Acenaphthene	2.55E-04	NA	Below
Acenaphthylene	1.40E-03	NA	Below
Acetaldehyde	2.32E-01	3.00E-03	Exceeds
Acetophenone	8.96E-07	NA	Below
Acrolein	1.12E+00	0.017	Exceeds
Anthracene	8.40E-04	NA	Below
Benzene	1.18E+00	8.00E-04	Exceeds
Benzo(a)anthracene *	1.82E-05	NA	Below
Benzo(a)pyrene *	7.28E-04	2.00E-06	Exceeds
Benzo(b)fluoranthene *	2.80E-05	NA	Below
Benzo(e)pyrene *	7.28E-07	NA	Below
Benzo(g,h,i)perylene *	2.60E-05	NA	Below
Benzo(j,k)fluoranthene *	4.48E-05	NA	Below
Benzo(k)fluoranthene *	1.01E-05	NA	Below
bis(2-Ethylhexyl)phthalate	1.32E-05	2.80E-02	Below
Bromomethane (methylene bromide)	4.20E-03	NA	Below
2-Butanone (MEK)	1.51E-03	39.3	Below
Carbazole	5.04E-04	NA	Below
Carbon Tetrachloride	1.26E-02	4.40E-04	Exceeds
Chlorobenzene	2.21E-01	23.3	Below
Chloroform	9.24E-03	2.80E-04	Exceeds
Chlorine	7.84E-03	0.2	Below
Chloromethane	6.44E-03	NA	Below
2-Chloronaphthalene	6.72E-07	NA	Below
Chrysene *	1.06E-05	NA	Below
Crotonaldehyde	2.77E-03	0.38	Below
Decachlorobiphenyl	7.56E-08	NA	Below
Dibenzo(a,h)anthracene *	2.55E-06	NA	Below
Dichlorobiphenyl	2.07E-07	NA	Below
1,2-Dichloroethane (ethylene dichloride)	8.12E-03	2.50E-04	Exceeds
Dichloromethane	8.12E-02	1.60E-03	Exceeds
1,2-Dichloropropane	9.24E-03	23.133	Below
2,4-Dinitrophenol	5.04E-05	NA	Below
Ethylbenzene	8.68E-03	29	Below
Fluoranthene	4.48E-04	NA	Below
Fluorene	9.52E-04	NA	Below
Formaldehyde	1.23E+00	5.10E-04	Exceeds
Heptachlorobiphenyl	1.85E-08	NA	Below
Hexachlorobiphenyl	1.54E-07	NA	Below
Heptachlorodibenzo-p-dioxins	5.60E-07	NA	Below
Heptachlorodibenzo-p-furans	6.72E-08	NA	Below
Hexachlorodibenzo-p-dioxins	4.48E-04	NA	Below
Hexachlorodibenzo-p-furans	7.84E-08	NA	Below
Hydrogen chloride **	1.86E-01	0.05	Exceeds
Indeno(1,2,3,c,d)pyrene *	2.44E-05	NA	Below
2-Methylnaphthalene	4.48E-05	NA	Below
Monochlorobiphenyl	6.16E-08	NA	Below
Naphthalene *	2.72E-02	3.33	Below
4-Nitrophenol	3.08E-05	NA	Below
Octachlorodibenzo-p-dioxins	1.85E-05	NA	Below
Octachlorodibenzo-p-furans	2.46E-08	NA	Below
Pentachlorodibenzo-p-dioxins	4.20E-07	NA	Below
Pentachlorodibenzo-p-furans	1.18E-07	NA	Below
Pentachlorobiphenyl	3.36E-07	NA	Below
Pentachlorophenol	1.43E-05	0.033	Below
Perylene	1.46E-07	NA	Below
Phenanthrene	1.96E-03	NA	Below
Phenol	1.43E-02	1.27	Below
Propionaldehyde	1.71E-02	0.0287	Below
Pyrene	1.04E-03	NA	Below
Styrene	5.32E-01	6.67	Below
2,3,7,8-Tetrachlorodibenzo-p-dioxins	2.41E-09	NA	Below
Tetrachlorodibenzo-p-dioxins	1.32E-07	NA	Below
2,3,7,8-Tetrachlorodibenzo-p-furans	2.52E-08	NA	Below
Tetrachlorodibenzo-p-furans	2.10E-07	NA	Below
Tetrachlorobiphenyl	7.00E-07	NA	Below
Tetrachloroethene	1.06E-02	1.30E-02	Below
Trichlorobiphenyl	7.28E-07	NA	Below
1,1,1-Trichloroethane	8.68E-03	NA	Below
Trichloroethene	8.40E-03	17.93	Below
Toluene	2.58E-01	26	Below
2,4,6-Trichlorophenol	6.16E-06	1.20E-03	Below
Vinyl Chloride	5.04E-03	9.40E-04	Exceeds
o-Xylene	7.00E-03	29	Below
Dichlorobenzene	1.18E-08	20	Below
N-Hexane	1.76E-03	12	Below

Renewable Energy of Idaho
Hazardous Air Pollutants Calculations (HAP)
Stoker Wood Waste Boiler

Hours of Operation	6576	8146	hr/yr
Heat Input =	280.0	280.0	MMBtu/hr

Trace Element HAP	AP-42 Emission Factor lb/MMBTU	Assumed no ESP Control ***	CAA 112(b) HAP?	Emissions lb/hr	HAP Emissions (8760 hr/yr) TPY	IDAPA 58.01.01.585/586 - EL lb/hr	PTE Emission Rate vs. EL
Antimony	7.90E-06		Y	4.27E-05	1.74E-04	0.033	Below
Arsenic	2.20E-05		Y	1.19E-04	4.86E-04	1.50E-06	Exceeds
Barium	1.7E-04		N	9.20E-04	0.00E+00	0.033	Below
Beryllium	1.10E-06		Y	5.95E-06	2.42E-05	2.80E-05	Below
Cadmium (volatile metal)	4.10E-06	X	Y	1.15E-03	4.68E-03	3.70E-06	Exceeds
Chromium, total	2.10E-05		Y	1.14E-04	4.63E-04	0.033	Below
Chromium, hexavalent	3.50E-06		N	1.89E-05	0.00E+00	0.033	Below
Cobalt	6.50E-06		Y	3.52E-05	1.43E-04	0.0033	Below
Copper	4.9E-05		N	2.65E-04	0.00E+00	0.067	Below
Iron	9.9E-04		N	5.35E-03	0.00E+00	0.333	Below
Lead (volatile metal)	4.80E-06	X	Y	1.34E-02	5.47E-02	NA	Below
Manganese	1.60E-03		Y	8.65E-03	3.52E-02	0.333	Below
Mercury (volatile metal)	3.50E-06	X	Y	9.80E-04	3.99E-03	0.007	Below
Molybdenum	2.1E-06		N	1.14E-05	0.00E+00	0.333	Below
Nickel	3.30E-05		Y	1.79E-04	7.27E-04	2.70E-05	Exceeds
Phosphorus	2.70E-05		Y	1.46E-04	5.95E-04	0.007	Below
Potassium	3.9E-02		N	2.11E-01	0.00E+00	NA	Below
Selenium (volatile metal)	2.80E-06	X	Y	7.84E-04	3.19E-03	0.013	Below
Silver	1.7E-03		N	9.20E-03	0.00E+00	0.007	Exceeds
Sodium	3.6E-04		N	1.95E-03	0.00E+00	NA	Below
Tin	2.3E-05		N	1.24E-04	0.00E+00	0.007	Below
Vanadium	9.8E-07		N	5.30E-06	0.00E+00	0.003	Below
Yttrium	3.0E-07		N	1.62E-06	0.00E+00	0.067	Below
Zinc	4.2E-04		N	2.27E-03	0.00E+00	0.667	Below
Total Organic HAP					20.7		
Total Trace Element HAP					0.10		
Total HAPs					20.9		

Emission Factors based on AP-42 (Table 1.6-3)
Emission Factors based on AP-42 (Table 1.6-4)

Summary of TAPS/HAPS

Trace Element HAP	Total Emissions lb/hr	IDAPA 58.01.01.585/586 - EL lb/hr	PTE Emission Rate vs. EL
Antimony	4.27E-05	0.033	Below
Arsenic	1.19E-04	1.50E-06	Exceeds
Barium	9.20E-04	0.033	Below
Beryllium	5.95E-06	2.80E-05	Below
Cadmium (volatile metal)	1.15E-03	3.70E-06	Exceeds
Chromium, total	1.15E-04	0.033	Below
Chromium, hexavalent	1.89E-05	0.033	Below
Cobalt	3.52E-05	0.0033	Below
Copper	2.65E-04	0.067	Below
Iron	5.35E-03	0.333	Below
Lead (volatile metal)	1.34E-02	NA	Below
Manganese	8.65E-03	0.333	Below
Mercury (volatile metal)	9.80E-04	0.007	Below
Molybdenum	1.14E-05	0.333	Below
Nickel	1.81E-04	2.70E-05	Exceeds
Phosphorus	1.46E-04	0.007	Below
Potassium	2.11E-01	NA	Below
Selenium (volatile metal)	7.84E-04	0.013	Below
Silver	2.20E-03	0.007	Exceeds
Sodium	1.95E-03	NA	Below
Tin	1.24E-04	0.007	Below
Vanadium	5.30E-06	0.003	Below
Yttrium	1.62E-06	0.067	Below
Zinc	2.27E-03	0.667	Below

* Polycyclic Organic Matter is the sum of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(a)pyrene.

** NCASI provides 6.7E-4 lb/mmbtu as the mean. Table 20A Technical Bulleting No 858. "Compilation of 'Alt Toxic' and total hydrocarbon emissions data for soruces at kraft, sulfit and non-chimical pulp mills and update" February 2003

***Assumed ESP Particulate Control - Based on IDEQ PM factors of 6.8 lb/hr (uncontrolled), 0.17 lb/hr (controlled)

98%

Burner 1 MMBtu/hr heat input natural gas fired used for startup of the Boiler
Startup limited to 25 hours per year
Emissions estimated based on AP-42 Section 1.4 Natural Gas Combustion

Fuel Heat Value	1020	Btu/scf
Burner Heat Input	1	MMBtu/hr
Maximum annual hours of operation	25	hr/yr

Pollutant - HAP	AP-42 Emission Factor lb/MMSCF	CAA 112(b) HAP?	Emissions lb/hr	HAP Emissions tpy	IDAPA 58.01.01.585/586 EL lb/hr	PTE Emission Rate vs. EL
Benzene	2.10E-03	Y	0.00	0.00	8.00E-04	Below
Dichlorobenzene	1.20E-03	Y	0.00	0.00	20	Below
Formaldehyde	7.50E-02	Y	0.00	0.00	5.10E-04	Below
n-Hexane	1.8	Y	0.00	0.00	12	Below
Naphthalene	6.10E-04	Y	0.00	0.00	3.33	Below
POM	8.82E-05	Y	0.00	0.00	NA	Below
Toluene	3.40E-03	Y	0.00	0.00	25	Below
Arsenic	2.04E-04	Y	0.00	0.00	1.50E-06	Below
Beryllium	1.20E-05	Y	0.00	0.00	2.80E-05	Below
Cadmium	1.10E-03	Y	0.00	0.00	3.70E-06	Below
Chromium	1.40E-03	Y	0.00	0.00	0.033	Below
Cobalt	8.40E-05	Y	0.00	0.00	0.0033	Below
Lead	0.0005	Y	0.00	0.00	NA	Below
Manganese	3.80E-04	Y	0.00	0.00	0.333	Below
Mercury	2.60E-04	Y	0.00	0.00	0.007	Below
Nickel	2.10E-03	Y	0.00	0.00	2.70E-05	Below
Selenium	2.40E-05	Y	0.00	0.00	0.013	Below
Total Organic HAP						0.00
Total Trace Element HAP						0.00
Total HAPs						0.00

Emission Factors based on AP-42 Table 1.4-3 (7/98)
Emission Factors based on AP-42 Table 1.4-3 (7/98)

Renewable Energy of Idaho

Boiler Data Sheet

	8,146 hr/yr		
	Zurn Stoker (uncontrolled)	Zurn Stoker (controlled)	Basis
Fuel Input (HHV) (MMBtu/hr)	280	280	
Electric Gross output (MWe)			
Electric Net output (MWe)			
Fuel Analysis (Biomass Hog Fuel).			
HHV dry (Btu/lb)	7500	7500	Yellowstone Power
HHV wet (Btu/lb)			Yellowstone Power
Fuel Input (lb/hr)	35500	35500	Based on Gates Cycle
Moisture (%)	17.0	17.0	Yellowstone Power
Initial deformation temp for ash (F)			
Carbon (wt-% dry basis)	51.7	51.7	Yellowstone Power
Hydrogen (wt-% dry basis)	6.0	6.0	Yellowstone Power
Oxygen (wt-% dry basis)	38.2	38.2	Yellowstone Power
Nitrogen (wt-% dry basis)	0.5	0.5	Yellowstone Power
Sulphur (wt-% dry basis)	0.030	0.030	Yellowstone Power
Ash (wt-% dry basis)	3.5	3.5	Yellowstone Power
Chlorine (wt-% dry basis)	0.0	0.0	Yellowstone Power
Stack flue gas mass flow (lb/hr)	296455	296455	
Density of Exhaust (lb/ft^3)	0.041	0.041	
Stack flue gas volume flow (acfm) *	119892	119892	
Diameter of Stack (ft)	10	10	
Area of stack discharge (ft^2)	78.5	78.5	
Exit Velocity (ft/sec)	25.4	25.4	
Stack Temp (F)	323.67	323.67	
Stack flue gas std. volume flow (acfm)			
Stack flue gas std. Dry volume flow (sdcfm)			
CO (ppmdv)	1395ppm @ 12% O2	100ppm @ 3.75% O2	Mobotech -ROFA technology (Guarantee)
CO (lb/hr) **	575	21.5	
CO (lbs/MMBtu)	2.05	0.08	
CO (tpy)	1890.6	87.6	
SO2 (lb/hr)	1.33	1.33	
SO2 (lbs/tons burned)	0.075	0.075	IDEQ emission factor guide for Wood Industry (1/1997) wood-fired spreader stoker
SO2 (tpy)	4.38	5.42	
NOx (lb/hr)	137.2	23.32	
NOx (lbs/MMBtu)	0.49	0.083	Mobotech -ROFA technology, SNCR (83% reduction of NOx emissions)
NOx (tpy)	451	95	
PM10 (lb/hr)	78.1	3.02	
PM10 (lbs/tons burned)	4.4	0.17	IDEQ emission factor guide for Wood Industry (1/1997) wood-fired with electrostatic precipitator
PM10 (tpy)	256.8	12.29	
Total PM (lb/hr)	156.20	3.02	
Total PM (lbs/tons burned)	8.8	0.17	IDEQ emission factor guide for Wood Industry (1/1997) wood-fired with electrostatic precipitator
Total PM (tpy)	513.59	12.29	
VOC (lb/hr)	3.91	3.91	
VOC (lbs/tons burned)	0.22	0.22	IDEQ emission factor guide for Wood Industry (1/1997) wood-fired spreader stoker
VOC (tpy)	12.84	15.91	
NH3 (ppmdv)	0	5	Mobotech
NH3 (lb/hr)	0	2.06	
NH3 (tpy)	0	8.39	

Exhaust data from 10/14/2004 Gate Cycle Report - prepared by B. Ryan.

Boiler Startup preheater emissions
Burner: 1 MMBtu/hr heat input natural gas fired
Startup limited to 25 hours per year

Fuel Heat Value	1020	Btu/scf
Burner Heat Input	1	MMBtu/hr
Maximum annual hours of operation	25	hr/yr

Pollutant	lb/MMSCF	lb/hr	tpy
NOx	100	0.10	0.00
CO	84	0.08	0.00
SO2	0.6	0.00	0.00
VOC	5.5	0.01	0.00
PM10	7.6	0.01	0.00
PM	7.6	0.01	0.00

Emissions Factors based on AP-42 Table 1.4-1 (7/98)
Emission Factors based on AP-42 Table 1.4-2 (7/98)

<u>Notes</u>

* Stack flue gas volume flow (acfm) = mass flow (lb/hr) / density of exhaust (lb/ft^3) / 60 min/hr
* Density of exhaust (lb/ft^3) = MW * Pa / R / T

where:			
	MW =	molecular weight of exhaust (lb/lb-mole)	
	Pa =	11.99	psi
	R =	10.73	gas constant
	Ta =	temperature of exhaust (K)	

<u>** CO lb/hr calcuation</u>

Using exhaust flowrate data:	575 lb/hr = 1395 ppm @ 12% O2
Mobotech quote:	100 ppm @ 3.75% O2
This is equivalent to:	52.2 ppm @ 12% ([100ppm x (21-12)/(21-3.75) = 52.2 ppm]
Thus prorating previous data:	21.5 lb/hr CO [575 lb/hr x 52.2 ppm / 1395 ppm = 21.5 lb/hr CO]

Renewable Energy of Idaho

Debarker

10 ft segments of log (assume 2-8hr shifts per day, 5 days per week, 52 weeks per year (4,160 hr/yr))

Dimensions of a log without bark: 120 inches length 11 inches diameter

Maximum hourly production rate: $110 \frac{\text{logs}}{\text{hr}}$

Maximum annual production rate: $460000 \frac{\text{logs}}{\text{yr}}$

Idaho DEQ Emission Factor Guide for Wood Industry (1/1997), Log Debarking

PM = 0.024 lb/ton logs

PM10 = 0.011 lb/ton logs

Potential Emissions

Debarker	lb/hr	tpy
PM	0.47	0.29
PM10	0.21	0.13

70 % water spray

Potential Emissions Calculations:

Assume that a log may be treated as a cylinder. The volume of a cylinder can be found by multiplying the length by the cross sectional area (3.14 * r^2). Therefore, the volume of a peeled log is:

120 inches/log x [11/2 inches]^2 x 3.14 x [1ft^3/1728 inches^3] = $6.60 \frac{\text{ft}^3}{\text{log}}$

Based on data from the report Forest Products Measurements and Conversion Factor: With Special Emphasis on the U.S. Pacific Northwest, by David Briggs, indicates that for Douglas fir bark is 22 percent of total volume of a tree, the remaining 78 percent is wood. The density of green Douglas Fir is reported as 42 lbs/ft^3. Assuming this is uniform for the four species of logs, the mass of wood and bark in one tree is:

$$6.60 \frac{\text{ft}^3}{\text{log}} \times \frac{1\ \text{ft}^3\ \text{tree with bark}}{0.78\ \text{ft}^3\ \text{debarked log}} \times 42 \frac{\text{lb}}{\text{ft}^3} = 355.18 \frac{\text{lb (with bark)}}{\text{log}}$$

Mass of wood entering the debarker:

$$355.18 \frac{\text{lb (with bark)}}{\text{log}} \times 110 \frac{\text{logs}}{\text{hr}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} \quad 19.5 \frac{\text{tons}}{\text{hr}}$$

$$355.18 \frac{\text{lb (with bark)}}{\text{log}} \times 460000 \frac{\text{logs}}{\text{yr}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} \quad 81{,}691 \frac{\text{tons}}{\text{yr}}$$

Maximum Hourly PM emissions:

$$19.53 \frac{\text{tons}}{\text{hr}} \times 0.024 \frac{\text{lb PM}}{\text{ton logs}} = 0.47\ \text{lb/hr PM}$$

Maximum Annual PM emissions:

$$81{,}691 \frac{\text{tons}}{\text{yr}} \times 0.024 \frac{\text{lb PM}}{\text{ton logs}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 0.98\ \text{tpy PM}$$

Maximum Hourly PM10 emissions:

$$19.53 \frac{\text{tons}}{\text{hr}} \times 0.011 \frac{\text{lb PM10}}{\text{ton logs}} = 0.21\ \text{lb/hr PM10}$$

Maximum Annual PM10 emissions:

$$81{,}691 \frac{\text{tons}}{\text{yr}} \times 0.011 \frac{\text{lb PM10}}{\text{ton logs}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 0.45\ \text{tpy PM10}$$

Renewable Energy of Idaho

Sawmill

10 ft segments of log (assume 2-8hr shifts per day, 5 days per week, 52 weeks per year)

All of the sawdust and bark will travel through the mill in a chain conveyor and then travel through an enclosed belt conveyor to the fuel house. All machinery will be enclosed in buildings and a water mist is used to cool saws and hold down the dust.

Dimensions of a log without bark: 120 inches length 11 inches diameter

Maximum hourly production rate: $110 \frac{\text{logs}}{\text{hr}}$

Maximum annual production rate: $460000 \frac{\text{logs}}{\text{yr}}$

Idaho DEQ Emission Factor Guide for Wood Industry (1/1997), Sawing Logs

PM = 0.350 lb/ton logs

PM10 = 0.200 lb/ton logs

Potential Emissions

Sawmill	lb/hr	tpy
PM	0.68	1.43
PM10	0.39	0.82

90 % full enclosure with water spray

Potential Emissions Calculations:

Assume that a log may be treated as a cylinder. The volume of a cylinder can be found by multiplying the length by the cross sectional area (3.14 * r2). Therefore, the volume of a peeled log is:

120 inches/log x [11/2 inches]^2 x 3.14 x [1ft^3/1728 inches^3] = $6.60 \frac{\text{ft}^3}{\text{log}}$

Based on data from the report Forest Products Measurements and Conversion Factor: With Special Emphasis on the U.S. Pacific Northwest, by David Briggs, indicates that for Douglas fir bark is 22 percent of total volume of a tree, the remaining 78 percent is wood. The density of green Douglas Fir is reported as 42 lbs/ft^3. Assuming this is uniform for the four species of logs, the mass of wood and bark in one tree is:

$$6.60 \frac{\text{ft}^3}{\text{log}} \times \frac{1 \text{ ft}^3 \text{ tree with bark}}{0.78 \text{ ft}^3 \text{ debarked log}} \times 42 \frac{\text{lb}}{\text{ft}^3} = 355.18 \frac{\text{lb (with bark)}}{\text{log}}$$

Mass of wood entering the sawmill:

$$355.18 \frac{\text{lb (with bark)}}{\text{log}} \times 110 \frac{\text{logs}}{\text{hr}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \quad 19.53 \frac{\text{tons}}{\text{hr}}$$

$$355.18 \frac{\text{lb (with bark)}}{\text{log}} \times 460000 \frac{\text{logs}}{\text{yr}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} \quad 81{,}691 \frac{\text{tons}}{\text{yr}}$$

Maximum Hourly PM emissions:

$$19.53 \frac{\text{tons}}{\text{hr}} \times 0.350 \frac{\text{lb PM}}{\text{ton logs}} = 6.84 \text{ lb/hr PM}$$

Maximum Annual PM emissions:

$$81{,}691 \frac{\text{tons}}{\text{yr}} \times 0.350 \frac{\text{lb PM}}{\text{ton logs}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 14.30 \text{ tpy PM}$$

Maximum Hourly PM10 emissions:

$$19.53 \frac{\text{tons}}{\text{hr}} \times 0.200 \frac{\text{lb PM10}}{\text{ton logs}} = 3.91 \text{ lb/hr PM10}$$

Maximum Annual PM10 emissions:

$$81{,}691 \frac{\text{tons}}{\text{yr}} \times 0.200 \frac{\text{lb PM10}}{\text{ton logs}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 8.17 \text{ tpy PM10}$$

Renewable Energy of Idaho

Dry Kilns
Two identical units

Kilns will be Wellons double tracks with computerized controls. There will be a discharge of heated steam from kilns in the drying cycle.
Air drying approximately 91 days per year (March, April, May)
Assume 40 BF/hr and conversion of 2 from log scale to lumber scale

Maximum hourly production rate: $\frac{281,600 \text{ BF}}{32 \text{ hr}}$ total for 2 kilns

Maximum annual production rate: $36,800,000 \frac{\text{BF}}{\text{yr}}$ total for 2 kilns

Emission factors provided in Intermountain Forest Association report "Small-scale Kiln Study Utilizng Ponderosa Pine, Lodgepole Pine, White Fir, and Douglas Fir" 9/29/2000.

	VOC (lb/MBF)	Methanol (lb/MBF)	Formaldehyde (lb/MBF)
Ponderosa Pine	1.38	0.065	0.0029
White Fir	0.26	0.122	0.0028
Lodgepole Pine	1.08	0.060	0.0040
Douglas Fir	0.49	0.023	0.0010

Planned wood mix sent to dry kilns is 50% Ponderosa Pine, 10 % White Fir, 10% Lodgepole Pine, 30% Douglas Fir

Emission Factors Converted to Planned Wood Mix

VOC = 0.97 lb/MBF
Methanol = 0.058 lb/MBF
Formaldehyde = 0.0024 lb/MBF

Idaho DEQ Emission Factor Guide for Wood Industry (1/1997), Lumber Drying Kilns
PM = 0.33 lb/MBF
PM10 = 0.19 lb/MBF

Potential Emissions

Dry Kilns	lb/hr	tpy
VOC	8.54	17.85
PM	2.90	6.07
PM10	1.67	3.50
HAPs	0.53	1.11

Potential Emissions Calculations:
Maximum Hourly VOC emissions:

$$\frac{281,600 \text{ BF}}{32 \text{ hr}} \times \frac{0.97 \text{ lb VOC}}{1000 \text{ BF}} = 8.54 \text{ lb/hr VOC}$$

Maximum Annual VOC emissions:

$$36,800,000 \frac{\text{BF}}{\text{yr}} \times \frac{0.97 \text{ lb VOC}}{1000 \text{ BF}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 17.85 \text{ tpy VOC}$$

Maximum Hourly PM emissions:

$$\frac{281,600 \text{ BF}}{} \times \frac{0.33 \text{ lb PM}}{} = 2.90 \text{ lb/hr PM}$$

32 hr 1000 BF

Maximum Annual PM emissions:

$$36{,}800{,}000\ \frac{\text{BF}}{\text{yr}} \times \frac{0.33\ \text{lb PM}}{1000\ \text{BF}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 6.07\ \text{tpy PM}$$

Maximum Hourly PM10 emissions:

$$\frac{281{,}600\ \text{BF}}{32\ \text{hr}} \times \frac{0.19\ \text{lb PM10}}{1000\ \text{BF}} = 1.67\ \text{lb/hr PM10}$$

Maximum Annual PM10 emissions:

$$36{,}800{,}000\ \frac{\text{BF}}{\text{yr}} \times \frac{0.19\ \text{lb PM10}}{1000\ \text{BF}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 3.50\ \text{tpy PM10}$$

Maximum Hourly Methanol emissions:

$$\frac{281{,}600\ \text{BF}}{32\ \text{hr}} \times \frac{0.058\ \text{lb}}{1000\ \text{BF}} = 0.51\ \text{lb/hr Methanol}$$

Below TAP EL (17.3 lb/hr)

Maximum Annual Methanol emissions:

$$36{,}800{,}000\ \frac{\text{BF}}{\text{yr}} \times \frac{0.058\ \text{lb}}{1000\ \text{BF}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 1.07\ \text{tpy Methanol}$$

Maximum Hourly Formaldehyde emissions:

$$\frac{281600\ \text{BF}}{32\ \text{hr}} \times \frac{0.0024\ \text{lb}}{1000\ \text{BF}} = 0.021\ \text{lb/hr Formaldehyde}$$

Exceeds TAP EL (5.1E-4 lb

Maximum Annual Formaldehyde emissions:

$$36{,}800{,}000\ \frac{\text{BF}}{\text{yr}} \times \frac{0.0024\ \text{lb}}{1000\ \text{BF}} \times \frac{1\ \text{ton}}{2000\ \text{lb}} = 0.04\ \text{tpy Formaldehyde}$$

Total HAPs 0.53 lb/hr
Total HAPs 1.11 tpy

BF - board feet
MBF - thousand board feet
tpy - tons per year

Renewable Energy of Idaho

Planer

All shavings will be blown inside a pipe to a cyclone then into a storage cell for bagging. Assume 2-8hr shifts per day, 5 days per week, 52 weeks per year.
Assume 40 BF/hr and conversion of 2 from log scale to lumber scale

Maximum hourly production rate: 8,800 $\frac{BF}{hr}$

Maximum annual production rate: 36,800,000 $\frac{BF}{yr}$

Idaho DEQ Emission Factor Guide for Wood Industry (1/1997), Cyclone Exhaust, shavings

PM = 0.2 lb/ton dry wood
PM10 = 0.18 lb/ton dry wood

Potential Emissions

Planar	lb/hr	tpy
PM	0.49	1.03
PM10	0.44	0.92

Potential Emissions Calculations:

Assume the typical product planed on planer is 8 ft x 3.5 in x 1.5 in (3.5 board feet)

Volume per board 3.5 BF

Surface area of each planed side

Top	96 in x 3.5 in	336 in^2	
Bottom	96 in x 3.5 in	336 in^2	
Right	96 in x 1.5 in	144 in^2	
Left	96 in x 1.5 in	144 in^2	
Total		960 in^2	per board
Total		274.3 in^2	per board foot

Approximately 1/8 inch is planed off of four sides. The total volume of shavings generated per BF is:
Typically 1/32 inch is planed off however to be more conservative, 1/8 inch was used.

Vol per board = 120 in^3/board

Vol per BF = 34.29 in^3/BF = 0.0198 ft^3/BF

Assume the density of the lumber shavings is 28.1 lb/ft^3. The mass of the shavings per board foot is:

0.02 ft3/BF(28.1 lb/ft^3) 0.56 lb shaving/BF

Mass of shavings routed to the cyclone:

$$0.56 \frac{lb}{BF} \times 8{,}800 \frac{BF}{hr} \times \quad 4{,}906.3 \frac{lb}{hr}$$

$$0.56 \frac{lb}{BF} \times 36{,}800{,}000 \frac{BF}{yr} \times \frac{1\ ton}{2000\ lb} \quad 10{,}258.7 \frac{ton}{yr}$$

Maximum Hourly PM emissions:

$$4{,}906.3 \frac{ton}{hr} \times 0.20 \frac{lb}{ton} \times \frac{1\ ton}{2000\ lb} = 0.49 \quad \text{lb/hr PM}$$

Maximum Annual PM emissions:

10,258.7 $\frac{\text{ton}}{\text{yr}}$ x 0.20 $\frac{\text{lb}}{\text{ton}}$ x $\frac{\text{1 ton}}{\text{2000 lb}}$ = 1.03 tpy PM

Maximum Hourly PM10 emissions:

4,906.3 $\frac{\text{ton}}{\text{hr}}$ x 0.18 $\frac{\text{lb}}{\text{ton}}$ x $\frac{\text{1 ton}}{\text{2000 lb}}$ = 0.44 lb/hr PM10

Maximum Annual PM10 emissions:

10,258.7 $\frac{\text{ton}}{\text{yr}}$ x 0.18 $\frac{\text{lb}}{\text{ton}}$ x $\frac{\text{1 ton}}{\text{2000 lb}}$ = 0.92 tpy PM10

BF - board feet
MBF - thousand board feet
tpy - tons per year

Planer Throughput

The initial information was that the maximum hourly planer production rate was 5 board feet (BF) per hour. This corresponds, at 4,160 hours of operation per year, to an annual maximum production rate of about 21,000 BF.

$$\left(5\cdot\frac{BF}{hr}\right)\cdot\left(4160\frac{hr}{yr}\right) = 20800\frac{BF}{yr}$$

This appears to be unrealistically low, compared to typical planer mills. It was noted that the annual total dry kiln maximum annual production rate is 21 million BF per year, a factor of 10 higher than the planer throughput. The planer and dry kiln throughputs should be comparable. Therefore, asume that the planer throughputs, both hourly and annual, should be increased by a factor of 10. This would result in the following:

$$Planer\_max\_prod_{hourly} := 5000\frac{BF}{hr}$$

$$Planer\_annual\_hours := 4160\frac{hr}{yr}$$

$$Planer\_max\_prod_{annual} := (Planer\_max\_prod_{hourly})\cdot(Planer\_annual\_hours)$$

$$Planer\_max\_prod_{annual} = 20.8\times 10^{6}\frac{BF}{yr}$$

Process Weight Calculations - Based on the amount of boards going into the planer:

Assume the typical product planed on planer is 8 ft x 3.5 in x 1.5 in (3.5 board feet). The volume of a product can be found by multiplying the length by the cross sectional area. Therefore, the volume of the boards being sent to the planer:

96 inches x 3.5 inches x 1.5 x [1ft^3/1728 inches^3] = 0.29 $\frac{ft^3}{board}$ 0.083 $\frac{ft^3}{BF}$

Based on data from the report Forest Products Measurements and Conversion Factor: The density of green Douglas Fir is reported as 42 lbs/ft^3. Assuming this is uniform for the four species of logs, the mass of wood and bark in one tree is:

0.083 ft3/BF(42 lb/ft^3) 3.50 lb/BF

Mass of wood entering the planar:

3.50 $\frac{\text{lb}}{\text{BF}}$ x 8,800 $\frac{\text{BF}}{\text{hr}}$ x 30,800 $\frac{\text{lb}}{\text{hr}}$

3.50 $\frac{\text{lb}}{\text{BF}}$ x 36,800,000 $\frac{\text{BF}}{\text{yr}}$ x $\frac{\text{1 ton}}{\text{2000 lb}}$ 64,400 $\frac{\text{tons}}{\text{yr}}$

Renewable Energy of Idaho

Hog

Large 60" hog with a 500 hp electric motor.

Worse case scenario run - 3 days a month, or approximately 400 tons/month (432 hr/yr)

Maximum hourly production rate: 11 $\frac{\text{tons}}{\text{hr}}$ Assume only operate 12 hr/day (Trucks only unload upto 12 hrs/day

Maximum annual production rate: 4752 $\frac{\text{tons}}{\text{yr}}$

Idaho DEQ Emission Factor Guide for Wood Industry (1/1997), Log Debarking

PM = 0.024 lb/ton logs
PM10 = 0.011 lb/ton logs

Potential Emissions

Planar	lb/hr	tpy
PM	0.13	0.03
PM10	0.06	0.01

50 % partial enclosure

Potential Emissions Calculations:

Maximum Hourly PM emissions:

$$11.00\ \frac{\text{tons}}{\text{hr}} \quad \text{x} \quad 0.024\ \frac{\text{lb PM}}{\text{ton logs}} = 0.26 \ \text{lb/hr PM}$$

Maximum Annual PM emissions:

$$4{,}752\ \frac{\text{tons}}{\text{yr}} \quad \text{x} \quad 0.024\ \frac{\text{lb PM}}{\text{ton logs}} \quad \text{x} \quad \frac{1\ \text{ton}}{2000\ \text{lb}} = 0.06 \ \text{tpy PM}$$

Maximum Hourly PM10 emissions:

$$11.00\ \frac{\text{tons}}{\text{hr}} \quad \text{x} \quad 0.011\ \frac{\text{lb PM10}}{\text{ton logs}} = 0.12 \ \text{lb/hr PM10}$$

Maximum Annual PM10 emissions:

$$4{,}752\ \frac{\text{tons}}{\text{yr}} \quad \text{x} \quad 0.011\ \frac{\text{lb PM10}}{\text{ton logs}} \quad \text{x} \quad \frac{1\ \text{ton}}{2000\ \text{lb}} = 0.03 \ \text{tpy PM10}$$

tpy - tons per year

Renewable Energy of Idaho

Screen

Can handle 25 tons per hour. Operates when trucks unload, 18 trucks per day, 5 days per week, 20 minutes per truck (3120 hr/yr)

Maximum hourly production rate: 25 $\frac{tons}{hr}$ Assume only operate 12 hr/day (Trucks only unload up to 12 hrs/da

Maximum annual production rate: 78000 $\frac{tons}{yr}$

Idaho DEQ Emission Factor Guide for Wood Industry (1/1997), Log Debarking

PM = 0.024 lb/ton logs
PM10 = 0.011 lb/ton logs

Potential Emissions

Planar	lb/hr	tpy
PM	0.12	0.19
PM10	0.06	0.09

80 % partial enclosure with water spray

Potential Emissions Calculations:

Maximum Hourly PM emissions:

$$25 \frac{tons}{hr} \times 0.024 \frac{lb\ PM}{ton\ logs} = 0.60 \text{ lb/hr PM}$$

Maximum Annual PM emissions:

$$78{,}000 \frac{tons}{yr} \times 0.024 \frac{lb\ PM}{ton\ logs} \times \frac{1\ ton}{2000\ lb} = 0.94 \text{ tpy PM}$$

Maximum Hourly PM10 emissions:

$$25 \frac{tons}{hr} \times 0.011 \frac{lb\ PM10}{ton\ logs} = 0.28 \text{ lb/hr PM10}$$

Maximum Annual PM10 emissions:

$$78{,}000 \frac{tons}{yr} \times 0.011 \frac{lb\ PM10}{ton\ logs} \times \frac{1\ ton}{2000\ lb} = 0.43 \text{ tpy PM10}$$

tpy - tons per year

Renewable Energy of Idaho
Particulate Emissions Calculations
Cooling Tower Emissions

Method from AP 42, Sect.13.4-1

Emissions	
Water Flow Rate (gal/min)	16,800
Flow of cooling water (lbs/hr)	8,406,720
TDS of makeup water (mg/l or ppmw)	350
Cycles of Concentration	15
TDS of blowdown (mg/l or ppmw)	5,250
Flow of dissolved solids (lbs/hr)	44,135
Fraction of flow producing PM_{10} drift (1)	0.300
Control efficiency of drift eliminators (gal drift/gal flow)	0.00005
PM emissions from tower (lb/hr)	2.207
PM_{10} emissions from tower (lb/hr)	0.662
PM emissions from tower (tpy)	9.666
PM_{10} emissions from tower (tpy)	2.900
Particulate (PM-10) emissions from each tower cell (lb/hr)	0.331

Other Parameters	
Number of cells per tower (outlet fans)	2
Height at cell release (ft):	32.0
Discharge flow per cell (ACFM):	1,475,500
Diameter of each cell (ft):	12.0
Area of cell discharge (ft^2):	113
Average Temperature of cell discharge (degF):	68
Exit Velocity (ft/s):	217.44

Notes:

(1) From "Calculating Realistic PM_{10} Emissions From Cooling Towers" (J. Reisman, G. Frisbie). Presented at 2001 AWMA Annual Meeting.

Harbi Elshafei

From: Rick.McCormick@CH2M.com

Sent: Thursday, July 21, 2005 2:15 PM

To: Harbi Elshafei

Cc: William Rogers

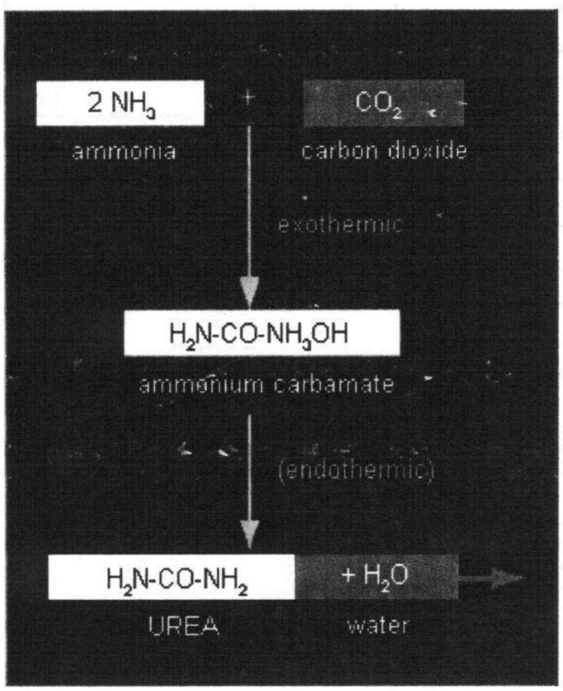
Subject: REI-Ammonia Slip

Harbi,

The ammonia slip is the amount of ammonia that does not react and passes through the system and out the stack. Our assumptions are based of the Gates Cycle Report.

The reaction of ammonia and carbon dioxide at high pressure and temperature form ammonium carbamate, which in turn is dehydrated into urea and water.

Process reactions
The process reactions occurring in urea processes are illustrated in the diagram of reaction sequences shown below. Two principal reactions take place in the formation of urea from ammonia and carbon dioxide.
The first reaction is exothermic and the second reaction is endothermic. Both reactions combined are exothermic.



The Mobotec Rotamix System is a third-generation SNCR system using urea (40% wt) mixed with dilution water. The urea and dilution water are mixed on a control rack, with individual flow control, and delivered through a lance into the furnace. Humidification water is delivered around the lance to help carry the urea further into the furnace (better coverage). This is what separates the Mobotec Rotamix System from other systems. During the initial start-up of the unit, Mobotec tunes the ROFA System first, then the Rotamix System. ROFA is optimized using the NOx and CO readings from the plant CEMS. The enhanced mixing provided by ROFA further increases the performance of the Rotamix System. After tuning ROFA, the Rotamix System is optimized using a temporary ammonia slip meter and the plant CEMS (NOx). The Rotamix System is tuned to optimize NOx reduction while minimizing ammonia slip (<10 ppm). Once the system is optimized, the Mobotec control system automatically controls the unit to the optimized levels.

The Mobotec System utilizes the plant CEMS for continuous monitoring of NOx and CO. During the tuning the phase, we will temporarily install a NH3 slip meter to tune the unit for less than 10 PPM slip.

For the Rotamix System (SNCR), the following flow rates apply:

Urea (40% wt): 0.3 gpm

Dilution Water: 0.5 gpm

Humidification Water: 2.1 gpm

The dilution water must be demineralized or better in quality.The humidification water can be city water.

Regards,

Rick McCormick, P.E.
Project Engineer
CH2M HILL - Boise
(208) 383-6457

APPENDIX B

Renewable Energy of Idaho, Emmett

P-050019

Modeling Review

MEMORANDUM

DATE: August 17, 2005

TO: Harbi Elshafei, Air Quality Division

THROUGH: Kevin Schilling, Stationary Source Modeling Coordinator, Air Quality Division KS

FROM: Dustin Holloway, Modeling Analyst, Air Quality Division DH

PROJECT NUMBER: P-050019

SUBJECT: Modeling Review for the Renewable Energy of Idaho, Facility in Emmett, Idaho

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1. SUMMARY

Renewable Energy of Idaho (REI) submitted air quality dispersion modeling in support of a permit to construct application for an 18 megawatt biomass-fired electric generating plant, sawmill, and planer mill. The analysis included a significant impact level (SIL) analysis, facility-wide impact analysis for pollutants whose ambient concentrations exceeded the applicable SIL, and a toxic air pollutant (TAP) impact analysis. CH2M Hill, REI's consultant, conducted the analysis. The following table summarizes the key assumptions and conclusions from the analysis which should be considered during permit development.

Table 1.1 KEY ASSUMPTIONS AND CONCLUSIONS OF MODELING ANALYSIS

Assumption/Conclusion	Explanation
The results of the analysis demonstrate that the dry kilns and fugitive emission sources are the primary contributors to the maximum ambient concentrations of PM_{10}.	The boiler and cooling towers are very small contributors to the maximum concentrations and do not require additional permit requirements to assure compliance with the NAAQS.

Based on the results of the analyses, DEQ has determined that the modeling analysis: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) appropriately adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that predicted pollutant concentrations at all receptor locations, when appropriately combined with background concentrations, were below stated air quality standards; 5) demonstrated that impacts of TAPs were all below allowable increments of IDAPA 58.01.01.585 and 586.

2. BACKGROUND INFORMATION

2.1 Applicable Air Quality Impact Limits

The REI facility is located in Emmett, in Gem county. Gem county is designated attainment or unclassifiable for all criteria air pollutants. The following table summarizes the applicable ambient air quality standards for this area.

Table 2.1 APPLICABLE REGULATORY LIMITS

Pollutant	Averaging Period	Significant Contribution Levels $(\mu g/m^3)$[a, b]	Regulatory Limit $(\mu g/m^3)$[c]	Modeled Value Used[d]
PM_{10}[e]	Annual	1	50[f]	Maximum 1st highest[g]
	24-hour	5	150[h]	Maximum 6th highest[i] Highest 2nd highest[j]
CO	8-hour	500	10,000[k]	Highest 2nd highest[g]
	1-hour	2000	40,000[k]	Highest 2nd highest[g]
SO_2	Annual	1	80[f]	Maximum 1st highest[g]
	24-hour	5	365[k]	Highest 2nd highest[g]
	3-hour	25	1,300[k]	Highest 2nd highest[g]
NO_2	Annual	1	100[f]	Maximum 1st highest[g]
Arsenic	Annual	N/A	2.3E-04	Maximum 1st highest[g]
Cadmium	Annual	N/A	5.6E-04	Maximum 1st highest[g]
Formaldehyde	Annual	N/A	7.7E-02	Maximum 1st highest[g]

[a] IDAPA 58.01.01.006.93
[b] Micrograms per cubic meter
[c] IDAPA 58.01.01.577 for criteria pollutants, IDAPA 58.01.01.585 for non-carcinogenic toxic air pollutants IDAPA 58.01.01.586 for carcinogenic toxic air pollutants.
[d] The maximum 1st highest modeled value is always used for significant impact analysis and for all toxic air pollutants.
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f] Never expected to be exceeded in any calendar year.
[g] Concentration at any modeled receptor.
[h] Never expected to be exceeded more than once in any calendar year.
[i] Concentration at any modeled receptor when using five years of meteorological data.
[j] The highest 2nd high is considered to be conservative for five years of meteorological data.
[k] Not to be exceeded more than once per year.

2.2 Background Concentrations

DEQ updated the background concentration data for Idaho in the Spring of 2003[1]. The values used in this analysis are the default values for rural agricultural areas in Idaho with the exception of PM_{10} background concentrations. The PM_{10} values used in this analysis are those for small town/suburban areas in Idaho. This value was used because of the proximity of this facility to Boise. Recent Treasure Valley PM_{10} airshed modeling has shown that PM_{10} concentrations near Emmett may be more appropriately characterized as small town/suburban than rural/agricultural. The following table summarizes the background concentrations used in this analysis.

Table 2.2 BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background concentrations $(\mu g/m^3)$[a]
PM_{10}	24-hour	81
	Annual	27
NO_2	Annual	17

[a] Micrograms per cubic meter.

1 Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling*. Memorandum to Mary Anderson, March 14, 2003.

3. ASSESSMENT OF MODELING ANALYSIS

3.1 Modeling Methodology

CH2M HILL conducted the dispersion modeling analysis for REI. The project is for a biomass-fired electrical generating facility. The following table summarizes the modeling parameters used in the analysis and DEQ's review and determination of those parameters.

Table 3.1 MODELING PARAMETERS

Parameter	What Facility Submitted	DEQ's Review/Determination
Modeling protocol	Reviewed and approved by DEQ	The modeling analysis was conducted in accordance with the methods outlined in the protocol and DEQ's comments on the protocol.
Model Selection	ISCPRIME	This is an appropriate model for this facility
Meteorological Data	1987-1991 Boise meteorological data	This is the most representative data available for this area.
Model Options	Regulatory default	Regulatory defaults are appropriate for this analysis.
Land Use	Rural	This facility is located in a rural area.
Terrain	Terrain effects were accounted for	Receptor elevations were included in the modeling analysis and the model was run to account for the effects of both simple and complex terrain.
Building Downwash	The effects of buildings on pollutant dispersion were calculated.	The effects of downwash were calculated with the PRIME algorithm. The PRIME algorithm calculates both building wake effects and building recirculation cavity effects.
Receptor Network	25 meter spacing along the fenceline; 100 meter spacing out to 1,200 meters; 500 meter spacing out to 5,500 meters;	This receptor network is sufficient to reasonably resolve the maximum concentrations.
Facility Layout	The model included the buildings located at the facility.	The facility layout was compared to the facility plot plan submitted by the applicant to verify the building and stack locations.

The applicant used a single stack with an inflated diameter to represent the emissions from the dry kiln vents. The PRIME algorithm uses the stack diameter in the dispersion calculation, and inflation of the stack diameter causes erroneous results. DEQ revised the analysis by representing the dry kiln vents as a group of six stacks with 1.5 meter exit diameters, and an exit velocity of 0.001 meters per second. The kiln emissions were split equally amongst the representative stacks. The resulting concentrations were still within the applicable NAAQS.

3.2 Emission Rates

Table 3.2 summarizes the emission rates used in the modeling analysis. The applicant submitted a modeling update on July 26, 2005. The planer was removed from the analysis because the planer emissions are now vented to the facility's cyclones.

Table 3.2 MODELED EMISSION RATES

Source ID	Source Description	PM_{10}[a]	PM_{10}[b]	Formaldehyde	NO_2	SO_2 (lb/hr)	Toxics (lb/hr)[c]
CT1	Cooling Tower 1	0.33	0.33	0.0	0.0	0.0	0.0
CT2	Cooling Tower 2	0.33	0.33	0.0	0.0	0.0	0.0
BOILER	Boiler	3	2.81	1.15	39.0	1.2	7.94
SAW	Sawmill	0.39	0.19	0.0	0.0	0.0	0.0
KILN1	Representative Dry Kiln Stack 1	0.28	0.13	1.52E-03	0.0	0.0	0.0
KILN2	Representative Dry Kiln Stack 2	0.28	0.13	1.52E-03	0.0	0.0	0.0
KILN3	Representative Dry Kiln Stack 3	0.28	0.13	1.52E-03	0.0	0.0	0.0
KILN4	Representative Dry Kiln Stack 4	0.28	0.13	1.52E-03	0.0	0.0	0.0
KILN5	Representative Dry Kiln Stack 5	0.28	0.13	1.52E-03	0.0	0.0	0.0
KILN6	Representative Dry Kiln Stack 6	0.28	0.13	1.52E-03	0.0	0.0	0.0
CYCLONE1	Cyclone No. 1	0.22	0.11	0.0	0.0	0.0	0.0
CYCLONE2	Cyclone No. 2	0.22	0.11	0.0	0.0	0.0	0.0
TP1	Conveyor Transfer Point 1	0.03	0.11	0.0	0.0	0.0	0.0
TP2	Conveyor Transfer Point 2	0.16	0.16	0.0	0.0	0.0	0.0
TP3	Conveyor Transfer Point 3	0.11	0.03	0.0	0.0	0.0	0.0
TP4	Conveyor Transfer Point 4	0.12	0.12	0.0	0.0	0.0	0.0
TP5A	Conveyor Transfer Point 5	0.0061	0.01	0.0	0.0	0.0	0.0
HOG	Hog	0.06	0.00	0.0	0.0	0.0	0.0
SCR	Screen	0.06	0.02	0.0	0.0	0.0	0.0
TKUNLD	Truck Unloading	0.93	0.93	0.0	0.0	0.0	0.0
DEB	Debarker	0.21	0.03	0.0	0.0	0.0	0.0

[a] Short term maximum hourly emission rate.
[b] Hourly emission rate averaged over an entire year.
[c] Toxic pollutant concentrations, other than formaldehyde, from the boiler were estimated by calculating the maximum impact with an emission rate of 1 gram per second. The resulting concentration was then multiplied by the actual gram per second emission rate for each toxic pollutant.

3.3 Emission Release Parameters

The following table summarizes the emission release parameters for the sources in the analysis.

Table 3.3 POINT SOUREC EMISSION RELEASE PARAMETERS

Source ID	Easting (m)	Northing (m)	Elevation (m)	Height (ft)	Temperature (°F)	Exit Velocity (m/s)	Diameter (ft)
CT1	539,042.6	4,857,775.0	718.1	32.0	67.7	66.28	12.0
CT2	539,042.6	4,857,783.5	718.1	32.0	67.7	66.28	12.0
BOILER	539,010.8	4,857,816.0	718.1	100.0	323.3	7.74	10.0
SAW	539,046.1	4,857,961.0	714.3	24.0	51.1	0.001	3.0
KILN1	539,075.7	4,857,994.5	711.8	22.0	51.1	0.001	4.92
KILN2	539,080.8	4,857,988.0	711.8	22.0	51.1	0.001	4.92
KILN3	539,090.6	4,858,004.5	711.8	22.0	51.1	0.001	4.92
KILN4	539,095.3	4,857,997.5	711.8	22.0	51.1	0.001	4.92
KILN5	539,105.0	4,858,014.5	711.8	22.0	51.1	0.001	4.92
KILN6	539,110.2	4,858,005.5	711.8	22.0	51.1	0.001	4.92
CYCLONE1	539,249.8	4,857,985.5	713.1	42	69.5	0.001	4
CYCLONE2	539,258.4	4,857,976.0	713.5	42	69.5	0.001	4

Table 3.4 VOLUME SOURCE EMISSION RELEASE PARAMETERS

Source ID	Easting (m)	Northing (m)	Elevation (m)	Release Height (m)	Horizontal Dimension (m)	Vertical Dimension (m)
TP1	539,221.8	4,857,999.0	712.6	3.05	0.28	1.42
TP2	539,061.0	4,857,849.0	718.1	3.05	0.28	1.42
TP3	539,042.4	4,857,831.0	718.1	3.05	0.28	1.42
TP4	538,990.6	4,857,938.0	714.8	3.05	0.28	1.42
TP5A	539,246.4	4,857,983.0	713.2	3.05	0.28	1.42
HOG	539,224.9	4,857,994.5	712.8	4.87	0.32	0.63
SCR	539,232.6	4,858,003.0	712.1	2.44	1.23	2.46
TKUNLD	539,222.6	4,858,010.0	711.9	10.67	1.23	2.46
DEB	539,005.9	4,857,935.5	714.9	7.32	3.4	3.4

3.4 Results

The analysis included a significant impact analysis, a full-impact analysis for those pollutants whose emissions exceeded the SILs, and a toxic pollutant impact analysis. The following tables summarize the results from each analysis.

3.4.1 Significant Impact Analysis Results

Table 3.5 SIGNIFICANT IMPACT ANALYSIS RESULTS

Pollutant	Averaging Period	Ambient Concentration ($\mu g/m^3$)	Significant Contribution Levels ($\mu g/m^3$)	Exceeds the SCL (Y or N)
CO	1-hour	54.6	2000	N
	8-hour	38.0	500	N
SO_2	3-hour	2.9	25	N
	24-hour	1.1	5	N
	Annual	0.1	1	N
NO_2	Annual	2.0	1	Y

3.4.2 Full Impact Analysis Results

Table 3.6 FULL IMPACT ANALYSIS RESULTS

Pollutant	Averaging Period	Facility Ambient Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Ambient concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS
PM_{10}	24-hour	57.5	81	138.5	150	92.4%
	Annual	12.4	27	39.4	50	78.8%
NO_2	Annual	2.0	17	19.0	100	19.0%

3.4.3 Source Contributions

Table 3.7 PM_{10} SOURCE CONTRIBUTION

Source/Group ID	Design Concentration ($\mu g/m^3$)	Percent Contribution To Facility Ambient Impact
24-hour		
All	57.5	N/A
Boiler	1.9	3.3%
Cooling tower	0.1	0.1%
Cyclones	11.4	19.8%
Fugitives	43.2	75.0%
Kilns	49.0	85.1%
Sawmill	15.4	26.8%
Annual		
All	12.4	N/A
Boiler	0.1	1.2%
Cooling Towers	0.0	0.1%
Cyclones	1.2	9.9%
Fugitives	10.1	81.5%
Kilns	6.3	50.7%
Sawmill	2.0	16.5%

The source contributions were calculated to determine which sources contributed the most to the maximum modeled concentration. The source contributions do not add up to 100% because the maximums for each source are located at different receptors than the maximum for all sources.

3.4.4 Toxic Air Pollutants Results

Table 3.8 TOXIC POLLUTANT IMPACT RESULTS

Carcinogens	**Concentration (μg/m3)**	**AACC (μg/m3)**	**Percent of AACC**
Acetaldehyde	1.21E-02	4.50E-01	2.7%
Benzene	6.16E-02	1.20E-01	51.3%
Benzo(a)pyrene	3.80E-05	3.00E-04	12.7%
Carbon Tetrachloride	6.57E-04	6.70E-02	1.0%
Chloroform	4.82E-04	4.30E-02	1.1%
1,2-Dichloroethane	4.24E-04	3.80E-02	1.1%
Dichloromethane	4.24E-03	2.40E-01	1.8%
Formaldehyde	7.4E-02	7.7E-02	96.1%
Vinyl Chloride	2.63E-04	1.40E-01	0.2%
Arsenic	6.21E-06	2.30E-04	2.7%
Cadmium	6.00E-05	5.60E-04	10.7%
Nickel	9.34E-06	4.20E-03	0.2%
Non-Carcinogens	**Concentration (μg/m3)**	**AAC (μg/m3)**	**Percent of AAC**
Acrolein	9.52E-01	12.5	7.6%
Ammonia	3.50E+00	900	0.4%
Hydrogen Chloride	1.62E-01	375	0.0%
Silver	7.82E-03	5	0.2%

The results of the dispersion modeling analysis demonstrate, to DEQ's satisfaction, that this facility will not cause or contribute to a violation of any ambient air quality standards. Additionally the analysis demonstrates that the impacts of TAPs were all below allowable increments of IDAPA 58.01.01.585 and 586.

APPENDIX C

Renewable Energy of Idaho, Emmett

P-050019

AIRS Form

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: Renewable Energy of Idaho
Facility Location: Emmett, ID
AIRS Number: 045-00006

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	B							U
NO_x	A						A	U
CO	B							U
PM_{10}	B							U
PT (Particulate)	B		B					U
VOC	B							U (ozone)
THAP (Total HAPs)	B							U
			APPLICABLE SUBPART					
			Db					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).